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COLONY AND PROTECTORATE OF NIGERIA

# REPORT

ON THE

# Agricultural Department

FOR THE YEAR

# 1932

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# Annual Report on the Agricultural Department, Nigeria, 1932.

## Introductory.

1. Every year the programmes of the various sections of the department come to interlock more and more with each other. For instance the co-operation of the Agriculturist with Native Administrations seems to be a matter that is far removed from the question of the technical training of assistants in a departmental school: yet these two matters are in fact most closely connected; for if we are to withdraw from executive work and to become only the technical advisers of the Native Administrations, then it is essential that those administrations should have native agricultural staffs capable of assuming wide responsibilities and successfully exercising considerable authority. Again, the work of the chemical and botanical sections is interwoven with that of the agriculturists, and of the departmental schools. Such interlocking is so essential that the healthiness and efficiency of an Agricultural Department can almost be gauged by the extent to which it occurs. But, unfortunately for the head of the department, the more such interlocking occurs, the more difficult it becomes to record separately the activities of each section. Therefore, writing my prefatory paragraph after the remainder, I have great pleasure in recording that I have this year found the report exceptionally difficult to write; not only because of the necessity for omitting mention of many interesting lines of work that are still in their early stages, but also because of the impossibility of keeping, in one paragraph, to the work of only one section of the department. But on the other hand, I hope and think that any apology need apply only to this report, not to the work itself. For I am able to record a year of very satisfactory progress in all directions—in the specialists' work, in the experiments on the farms which are still the foundation of all other work, and in practically every one of the various lines of extension work in which the department is engaged, in almost every division of those provinces in which we are working. And, what is still more important, our extension work is of the kind that leads on to still greater annual progress. For it consists essentially of work carried out in direct personal relationship between officers and their assistants and ordinary individual farmers, with the co-operation of the Native Administration wherever such exists in present reality. There have been no new officers appointed for some years, so that all those now in the department have had some experience of the country and are able to "pull their weight." This fact, together with the cessation of the continual loss of officers by transfer on promotion to other colonies, from which we suffered so much in the past—all this has rendered possible a degree of continuity of personnel which could previously seldom be achieved. Most of the officers in charge of extension work have now been working for several years in the same area and have thus been able to make many personal friends among the local farmers. Such good progress in turn makes all the workers, native as well as European, feel that they are really achieving something; and that again naturally gives them increased confidence and stimulates their enthusiasm. The spirit of service and the *esprit de corps* of the department are now admirable. The necessity for carrying on more work with less money has been accepted in the best possible spirit. It is also a pleasure to me to be able to say that I think that officers are now, with increasing confidence and initiative, putting forward ideas of their own in constructive criticism of my views and policies.

### Locust Destruction Campaign 1932.

2. The actual work of destroying bands of hoppers by poisoning or driving has always been supervised chiefly by officers of the Administrative Department. But the Agricultural Department in 1930 and 1931, undertook responsibility for the entire organisation of the campaign—both the central organisation and that in each province. An agricultural officer was posted to this special duty in each province during the critical weeks. This duty was naturally a considerable handicap to our other work, and the cost of transfers and travelling of officers made a heavy drain on our vote for transport. After those two years experience, the methods of destruction had become well known, and the campaign had become almost a routine. In 1932, therefore, it was proposed that the administrative department should take over all responsibility from us. Both the Lieutenant-Governors—though this matter chiefly concerns the Northern Provinces—were good enough to agree to this. Exactly the same system and methods were used as previously; and, so far as it is possible to judge, the campaign was conducted no less efficiently than before. It is impossible to judge the present position accurately; for, before one can do so, it is necessary to know the situation throughout West Africa. By an international arrangement made some months ago, instead of our corresponding directly with our French neighbours, each informing the other of the local situation, both countries now report monthly to the Imperial Institute of Entomology. In return for these monthly reports, the Bureau proposed to issue authoritative three monthly appreciations of the general situation in West Africa as a whole. It is my opinion, and also that of the Entomologist, that there are less adult locusts in Nigeria now than there were a year ago. If therefore one could formulate an opinion from local knowledge alone, it would be to the effect that hoppers are likely to be less numerous in the coming season than last year; and that the danger of famine being caused by locusts is now very small.

### Locust Research Work in French West Africa.

3. Mr. O. B. Lean, Entomologist, worked for nearly a year in the Segou-Timbuktu area in French West Africa. The French Colonial Government welcomed his working there and gave him such assistance as he needed. After his arrival there, a French entomologist was also appointed to carry out similar work in another part of the area and was instructed to co-operate with Mr. Lean. [The helpful attitude of the French Colonial Government in this matter was highly appreciated by both Mr. Lean and myself.] The conditions under which this work has to be carried out are arduous and unhealthy. Unfortunately Mr. Lean's work was cut short by a serious illness, and consequent invaliding; while the French entomologist died after a few weeks. Mr. Lean resigned from the service when he reached England. He had been sending in monthly progress reports; but has not yet submitted his final report, so that it is impossible as yet for me to comment on his work as a whole. His monthly reports seemed to indicate that he was obtaining valuable information.

### Locust Research in the Chad Area.

4. Mr. F. D. Golding, Entomologist, on returning from leave proceeded to Kalkala, the village near Lake Chad which he had selected last year as most suitable for his purpose. He is continuing his investigations into the general ecology of locusts in the Chad area, and especially the conditions controlling the occurrence of the swarming phase of the Migratory and Red Locusts (*see* last year's report). Even apart from the local climate, the conditions under

which he has to work are extremely difficult. Methods that have been recommended by other workers for estimating the density of locusts and following their movements have proved useless, and new methods have had to be worked out. Mr. Golding is clearly gaining valuable information, but it is much too early to try to anticipate the conclusions to which his results will lead. The authorities at Kew are helping him in the identification of the local grasses, and he is in continuous direct correspondence with the Imperial Institute of Entomology. Thus, in spite of our not having any special "machinery for co-operation", this work is in fact carried on in the very closest co-operation possible with the authorities mentioned.

### American Cotton in the Northern Provinces.

5. At the end of 1931, thanks to the effective campaign against locusts, and a favourable harvest, foodstuffs in the Northern Provinces were very cheap and plentiful. Farmers found themselves the poorer for having partly given up cotton growing in favour of food crops. The fact that no serious damage was done by locusts in 1931 was taken to show that the danger of a famine was past. It was evident therefore that 1932-3 would see a swing of the pendulum back to cotton planting. Owing to the very small amount of cotton bought for export in 1931-2, the amount of seed available for 1932-3 was correspondingly small, and it was not quite possible to meet all demands for seed for planting. Opinions differ somewhat about the extent to which planting was limited by this factor, but I, personally, suspect that any reduction of the crop that was caused in this way was insignificant.

6. The weather this year was distinctly favourable for cotton, and the yield per acre in all districts was well above average. The local demand for cotton for hand spinning had apparently been more or less satiated by the large amount bought for this purpose in the previous season; and there were good crops this year even in those areas on the northern boundary which normally import raw cotton for spinning. The price offered for seed cotton for export out of the country was practically the same this season as last. Moreover there had been, in the previous buying season, and there was still more this season, what there had never been before, real and keen competition between an adequate number of wholly independent buyers of seed cotton. In consequence of these factors, the proportion of the crop which was purchased for export reverted to normal. In the result, the equivalent of nearly 22,000 bales were purchased this season as against less than 5,000 last year, and as against commercial advance estimates of 10,000 bales, and a departmental forecast of 23,000 bales.

7. The detailed figures which I give annually are brought up to date in the tables below :—

Exports of American Cotton (in Bales each of 400 lb. net) and Buying Prices (in pence per pound of Seed Cotton).

| Year. | Bales. | Price. | Year. | Bales. | Price. |
|---|---|---|---|---|---|
| 1915–16 | 121 | 1¾d. | 1924–25 | 27,996 | 3d. |
| 1916–17 | 433 | 1¾d. | 1925–26 | 37,356 | 2¼d. |
| 1917–18 | 855 | 2½d. | 1926–27 | 16,659 | 1⅝d. to 1¾d. |
| 1918–19 | 2,248 | 2¾d. | 1927–28 | 16,316 | 2⅜d. falling to 2¼d. |
| 1919–20 | 3,568 | 3¾d. | 1928–29 | 24,686 | 2¼d. falling to 2⅛d. |
| 1920–21 | 5,405 | 4½d. | 1929–30 | 34,389 | 1·6d. falling to 1·2d. |
| 1921–22 | 9,883 | 2d. | 1930–31 | 13,849 | Fluctuating between ·5d. and ·8d. |
| 1922–23 | 11,224 | 2½d. | 1931–32 | 4,949 | ·6d. rising to ·8d. |
| 1923–24 | 15,683 | 4d. falling to 3d. | 1932–33 | 21,820* | Fluctuating between ·8d. and ·9d. and finally falling to ·8d. |

* Approximate : up to 25-3-33 only.

THE AMOUNTS PURCHASED IN THE DIFFERENT PARTS OF THE COTTON BELT OF THE NORTHERN PROVINCES, DURING EACH OF THE LAST FIVE YEARS, WERE AS FOLLOWS :—

| | 1928–29. | 1929–30. | 1930–31. | 1931–32. | 1932–33* |
|---|---|---|---|---|---|
| Zaria :—Bauchi Line ... ... | 2,786 | 3,030 | 1,124 | 383 | 2,768 |
| Remainder ... ... | 2,094 | 2,601 | 543 | 297 | 1,535 |
| Katsina :—South ... ... ... | 9,800 | 15,253 | 8,582 | 3,651 | 8,751 |
| „ North ... ... ... | 1,880 | 2,106 | 273 | — | 1,587 |
| Sokoto Province ... ... ... | 7,069 | 10,227 | 2,856 | 590 | 6,772 |
| Kano Province ... ... ... | 357 | 425 | 5 | — | 294 |
| Niger Province ... ... ... | 471 | 747 | 466 | 28 | — |
| Total ... ... ... | 24,686 | 34,389 | 13,849 | 4,949 | 21,707 |

* Figures for 1932–33 are approximate to 18-3-33 only.

8. As will be seen from previous paragraphs, the local demand for seed cotton for hand spinning has, in the main, always to be satisfied first whatever the crop or the export price may be, and it is nearly accurate to say that it is only the surplus that is exported out of the country. In these circumstances, the volume of the export naturally varies much more than the gross production, according as the weather is favourable to high yields or not. Thus it is peculiarly difficult to predict what next year's export is likely to be until about the end of October, when the crop can be seen. Judging by the way seed is being taken by farmers for planting, it is anticipated that if the weather in 1933 is as favourable as last year, the export will be a good deal greater than last year. Even with average weather, the export may be expected to be somewhat greater than last year's.

## IMPROVEMENT OF QUALITY OF NORTHERN COTTON.

9. The new strain " L " was grown on 330 acres at the farm of the Empire Cotton Growing Corporation at Daudawa and proved satisfactory. The reports on the sale of the lint of this strain from Daudawa will enable us to gain some idea of the real commercial value of the superiority of this strain over the ordinary mixed strains grown at present. That it is superior has been proved repeatedly by valuations and spinning trials of small samples; but only the sale of a number of bales can show the commercial value of the superiority.

10. Meanwhile the thorough testing of the yield of this strain as compared with the ordinary mixture of types has been continued at Samaru on a more extensive scale. It is now fairly clear that the " L " yields rather better than the mixture of types on good land, but slightly worse on poor land. It is, in the nature of things, difficult to put such differences in exact and certain figures, but so far as we can judge, the figures may be as follows :—On a crop of upwards of 400 pounds per acre, the L strain will yield more than the ordinary by perhaps twenty or thirty pounds; on a crop of less than 200 lb. per acre, the ordinary mixture will be superior by about the same extent; on crops of 300 lb. per acre any difference will be small and an experiment probably inconclusive. In view of the superiority of the lint of " L ", it is considered to merit distribution.

11. Two years ago, when Jassids did so much damage to other cottons, L was not damaged. But the leaf of the L strain is not hairy, and it is felt that there must always be some danger in growing such a type. The crossing of L with other strains has therefore been started in the hope of obtaining a hairy-leaved plant

and as good as L or better in regard to the quality of the lint. An attempt is being made to accelerate the early stages of this work by growing a second crop in one year by means of irrigation.

### Ginger.

12. The purchases of peeled ginger in Southern Zaria in 1932-3 and previous seasons are shown in the following table :—

| | Grade I. | | Grade II. | | Grade III. | | Grade IV. | | Total. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Tons | Cwt. | Tons | Cwt. | Tons | Cwt. | Tons | Cwt. | Tons | Cwt. |
| 1930–31 ... | — | 6 | — | 15 | 14 | 3 | — | — | 15 | 5 |
| 1931–32 ... | — | 1 | 1 | 15 | 37 | 6 | — | — | 39 | 4 |
| 1932–33 ... | — | 1 | 2 | 5 | 48 | 10 | 2 | 6 | 53 | 2 |

There were increased quantities from some districts; for instance four tons nine cwt. were brought in across the border from the Plateau province this year as against one ton fifteen cwt. in 1931-32. But on the other hand there were decreases in some of the places, where this extension work was first started. The chief cause of the decreases was the unfavourably dry season; but there also appeared to be an increase in the petty trade in uncured or " green " ginger, which is exported from this part of the country to Kano and to places on the Eastern Railway line.

13. Hitherto the Agricultural officer has bought the ginger on behalf of the exporting firm, actually taking the firm's cash to the markets and accepting entire responsibility for the weights and accounts—a highly improper arrangement which was only justified by necessity and by success. This year the firm sent one of their own clerks to buy; and the department's activities at the markets were restricted to the grading which is our proper function. This year's prices and last year's were as follows :—

| | *1931-32.* | *1932-33.* |
|---|---|---|
| | d. | d. |
| Grade I ... ... | $3\frac{1}{2}$ | $3\frac{5}{8}$ |
| Grade II ... ... | $3\frac{1}{4}$ | $3\frac{1}{8}$ |
| Grade III ... ... | 3 | $2\frac{3}{8}$ |
| Grade IV ... ... | — | $1\frac{1}{2}$ |

Owing to a difference in the transport arrangements, however, the actual reduction of the price of grade III was really $\frac{1}{8}$d. and not $\frac{3}{8}$d. as appears from the above. The fourth grade, purchased this year for the first time, was discoloured peeled ginger. It was bought merely to prevent farmers who were new to this work from being too much discouraged. Instructional work about both cultivation and curing was continued, aiming at a still further improvement in quality; and again the quality of each grade was higher than before. The grades will now be maintained at the present level and it is hoped that next year there will be an increased production of grades I and II. Arrangements are being made for instruction in cultivation and curing to be given in some more pagan districts, and a steady increase in total production is anticipated for several years more at least.

### Mixed Farming Extension Work.

14. The sense in which the term " mixed farming " is used in Nigeria has been explained in previous reports. It means the ploughing of a farm of twelve acres or a little more with a pair of

bulls or bullocks, instead of farming three or four acres by hand. It also includes the making and use of farmyard manure, with consequent heavier crops. It will also, we hope, soon include the keeping of cows and rearing of young stock by farmers. It results, as farmers have already very clearly shown, in more timely planting of crops, more thorough cultivation and more frequent weeding of all crops. To the workers it means walking behind a pair of bullocks driving a plough or cultivator for six hours a day instead of ten hours gruelling work with the hoe or "galma" (hand plough-hoe). To the farmer's family it means rapid elevation to a totally different level of prosperity and social well-being.

15. The following figures show the numbers of farmers who have adopted the system this year, compared with similar statistics for last year. [It may be noted that the extension work was first started on an extremely small scale in 1928, *see* annual report for 1931.]

| Emirate. | No. at end of previous season. | Starting for first time. | *Failures during season. | Remaining at end of season. |
|---|---|---|---|---|
| 1931—Zaria ... ... ... | 5 | 21 | 2 | 24 |
| Kano ... ... ... | 12 | 8 | 2 | 18 |
| Katsina ... ... | ... | 1 | ... | 1 |
| Sokoto ... ... | ... | 1 | ... | 1 |
| TOTAL ... ... | 17 | 31 | 4 | 44 |
| 1932—Zaria ... ... ... | 24 | 43 | 1 | 66 |
| Kano ... ... ... | 18 | 11 | 6 | 23 |
| Katsina ... ... | 1 | 16 | ... | 17 |
| Sokoto ... ... | 1 | 1 | ... | 2 |
| TOTAL ... ... | 44 | 71 | 7 | 108 |

* Failures include farmers who give up the system for any cause (even some who have given up for one season only owing to the death of a bullock) as well as those who are advised to give it up because they do not appear to have the ability to succeed.

16. The forty-three new farmers who started in the Zaria Emirate included the Emir and seven District Heads. In the Katsina Emirate, of the sixteen new farmers who started this year, nine were district heads. The numbers of ordinary new farmers are enough to satisfy us that both our system and our methods of extension work are sound; but the most pleasing feature is the enthusiasm of the farmers themselves and the initiative which they display. The change from their old methods is revolutionary. It would not be surprising, therefore, if their attitude were tentative and hesitating for a year or two, until they had accustomed themselves to the change. But this is far from the fact: those farmers who have tried mixed farming for more than a year are in some respects already going faster than we are, and are quite ready to try something more that is new. For instance, one farmer, entirely on his own initiative, has worked out a new type of cattle pen, while others have given us new ideas about how to make the most of the fodders available as bye-products of the farm. In fact, we are now in the position of exchanging ideas with the farmers instead of merely teaching them. This happy state of affairs will greatly assist other parts of our work, such as the introduction of new strains and varieties of crops, and we are already utilising it in this way. Several of "our" farmers last year gave a trial to the Botanist's F.B. guinea-corn and were very pleased with it. This year they are proposing to try some of the Botanist's improved

groundnuts. It may also be mentioned that they are prepared to pay for the seed of these new varieties: in distributing the F.B. guinea-corn last year the system adopted was to exchange one bundle of ordinary guinea-corn for one bundle of F.B. plus one penny. As a bundle of corn was only worth about sixpence, the premium was not merely nominal.

### The Hire Purchase Scheme in Zaria.

17. In the Zaria Province, extension has again been most rapid in the area covered by the Maigana centre; but farmers from other parts of the Emirate are now coming forward in increasing numbers proposing to start in 1933. All the farmers who have taken up mixed farming in Zaria have done so entirely voluntarily—some of them come in as much as 100 miles to see the work at Maigana and they all gladly send their sons to the farm centre for training. The three measures described in last year's report for co-ordinating our work with Native Administrations have all worked satisfactorily; but it is probable that the introduction of the system of advances has done more than any other single factor to give an impetus to our extension work. Any fears that may have been entertained about the willingness or the ability of the farmers to repay the loans have been quite dispelled by this year's results. In the Zaria Emirate thirty-five farmers received advances of an average amount of £5 10s. 0d. The total amount so advanced was £194 13s. 0d. The farmers were required to pay a small sum in cash when they received their bullocks and implements, and at the end of the year to repay ten shillings in respect of capital and five shillings and sixpence in respect of hiring fees. Many of the farmers, in spite of having to sell their produce at an exceptionally low price, this season, have repaid more than was required of them; and to date all but four have already repaid the due amount. The total amount of capital repaid to date amounts to £35 and £9 14s. 0d. has been paid on account of hiring fees, making £44 14s 0d. in all.

18. The system that has been worked out in detail in Zaria will, it has been agreed, be adopted in other provinces, with only such slight modifications as local conditions may render essential. It therefore seems desirable to explain it somewhat fully here. In previous years, similar small advances had been given to a few farmers, at our request, by the Kano Native Administration and the Zaria Native Administration. But a serious difficulty arose in that the Emirs and the European Administrative Officers concerned held that, since the Native Administration officials are Mohamedans, interest could not be charged on the loans, although it is admitted that interest is frequently charged by ordinary individual Mohamedans among themselves. It is considered essential that the farmer should pay fairly for the financial help which he receives as otherwise it is clearly impossible for there ever to be any successful scheme for providing capital for northern peasants, whether by direct Government advances, by forming a special land bank, or even through co-operative societies. No bank or co-operative society can lend money without interest; and it would be hypocritical for Government to refuse to charge interest through its arm, the Native Administration, but to form a land bank or foster co-operative societies which charged interest. It was expected by the agricultural officers, and was soon proved in practice, that to advance money without charging interest was simply to invite certain failure. If a borrower does not pay interest, he has no incentive to make shift with a minimum loan at first, nor to repay it later. Repayments had therefore either to be extorted by pressure or else forgone: the former naturally tended to make the whole system of mixed farming unpopular, the latter would reduce

the loans to gifts. In economic affairs philanthropy is worse for the receiver than for the giver. Moreover, it is obviously wrong in principle that public money should be advanced to individuals, even for the most desirable and productive purposes, unless interest is charged and the principal repaid punctually, so that the public purse benefits directly and immediately as well as indirectly at a later date.

19. Looking ahead, the provision of capital to peasants for productive purposes must be a prime essential for the progress of this country, not merely in connection with the introduction of mixed farming (though it would be impossible to exaggerate the importance of that measure), but also to effect any widespread rural economic improvement (such for instance as the provision of wells for the purpose of irrigation). Clearly, therefore, some way out of the *impasse* described above had to be found. After much discussion with Emirs and Residents a hire-purchase scheme was evolved and approved by His Honour the Lieutenant-Governor, Northern Provinces, on the following lines :—

(*a*) Money is not advanced at all; but bullocks and implements are supplied to the farmer by the Native Administration. They are entered in the accounts of the Beit-el-Mal at cost price, and that is the price that the farmer has eventually to pay

(*b*) On receiving the stock and implements, the farmer makes a first minimum payment of not less than five shillings, as acknowledgment of his debt and of his promise to repay by instalments.

(*c*) Until they have been entirely paid for by the farmer, the stock and implements remain legally the property of the Native Administration, though naturally the farmer has to replace a bullock that dies or repair an implement that breaks. The farmer does not pay " jangali " (cattle tax) on the bullocks, because they are not his property; they are the property of Government, and Government does not tax its own property.

(*d*) Until he has fully paid for them, the farmer has to pay a hiring charge for the bullocks and cattle. This charge is quite separate and distinct from the purchase price. It is a flat rate of so many shillings per bullock, cow or implement, irrespective of the price, for instance, of the particular bullock in question. Of course if bullocks in general should happen to be twice as dear next year as they were last year, then the general hire charge for a bullock sold on hire purchase next year, will be double that charged for those sold last year; but it will remain a flat rate, the same for all bullocks sold next year. The rates are fixed so as roughly to amount to five *per cent. per annum*, simple interest, on the loan. This rate is possibly a little too low, but it has the merit of simplicity.

(*e*) The rate of repayment of principal is fixed by the Native Administration, the amount repayable in the first year being much less than in later years. The whole sum is repayable in three years. If a man repays, after one year, more than he is required to repay, then the hire charges in the next year are reduced accordingly.

(*f*) There is an adequate system of safeguards to ensure the selection of suitable men as hire-purchasers. The responsibilities of the agricultural officer, in his capacity of adviser to the Emir, and those of the District Head, are both clearly defined, so that there can be no laxity in working the scheme or keeping the accounts. Every one agrees that there is no objection on religious grounds to a scheme of this type; and it is entirely satisfactory on the practical side. It has had a fair trial in the Zaria Emirate this year, and that experience shows that the farmers consider it to be a fair and

reasonable system. Indeed there is little doubt that a good farmer accepts such a scheme more readily than he will accept an advance for which he pays nothing. In the latter case, he naturally thinks that Government must intend to get its profit out of him at some time in some way, and he does not know to what it may then amount. With a proper scheme, there is no cause for such suspicion, since the scheme is directly profitable to the Government, and the amounts that must be paid by the farmer each year are fixed at the beginning.

20. It cannot be too greatly stressed that in adopting such measures as giving advances and establishing farm centres and demonstration farms, the Native Administrations are directly assisting their farmers; and it is farmers who pay the bulk of the taxes. Such measures will do more than anything else to establish the prestige of the Native Administration among the ordinary people in the rural districts, and there is no doubt whatever that the Native Administrations will eventually derive great benefit therefrom.

### Farm Centres.

21. In the Sokoto Province, a new farm centre was started at Gusau last April and has completed a full cropping season. A demonstration farm which may subsequently develop into a farm centre was also started near Sokoto town at the same time. Work has already been started on a new farm centre at Birnin-Kebbi. Each of these will have its own peculiar problems to deal with; but there is every reason to believe that they will be of real benefit to the agriculture of the area which they serve.

22. The farm centre at Kafin Soli in Katsina continues fully to justify itself. It had a successful cropping season and several farmers in the neighbourhood are taking up mixed farming this year. These have already sent their sons and their cattle to the centre for training. But perhaps the most pleasing feature of Kafin Soli is the way in which it is justifying itself as the link between the Agricultural Department, the farmers and the Native Administration. The native manager is in direct touch with the Native Administration, keeps all the books and signs the vouchers. On the other hand, he is in direct touch with the farmers, and they are already beginning to write to him direct, when they want advice or assistance, instead of writing to the Superintendent of Agriculture. The Superintendent is thus beginning to be in reality as in theory only the adviser of the Native Administration official.

### Demonstration Farms.

23. A very successful farm was started last June at Mallamfashi in Southern Katsina. It is at present attached to the centre at Kafin Soli; but it will probably gradually develop into a farm centre for Southern Katsina. In the Kano Province, demonstration farms were started at Karaye and Rano and these will ultimately be supervised from the new farm centre which will shortly be started in Southern Kano more or less midway between these two demonstration farms. The demonstration farm at Karaye was particularly successful and the value of the produce almost exactly offset its cost—both capital and annual. The farm colony at Taura is being re-organised and will now become a demonstration farm. A new farm centre is being started at Daura, one of the small emirates in the north of Kano Province (*see* next paragraph). There is a real need for both a farm centre and some demonstration farms in the Zaria Emirate; but it is realised that these will have to wait until the finances of the emirate improve. In the meantime every effort is being made to develop a part of our farm at Maigana

as a Native Administration farm, exactly as though it were in actual fact the property of the Native Administration. For instance, the Mallam in charge of that portion of the Maigana farm sends reports direct to the Emir, just as he would if it actually belonged to the Native Administration.

### Extension Work in Kano Province.

24. In marked contrast to Zaria, progress in the Kano Province continues to be slow, and the border between the two provinces seems to be a definite line at which progress begins and ends. In the Zaria Province there are farmers who are taking up mixed farming whose farms are actually touching the boundary, and yet farmers on the other side have so far shown no desire to take it up.

25. There are three definite agricultural areas in the Kano Province, namely:—

(*a*) The northern Emirates.

(*b*) The thickly populated area around Kano City.

(*c*) The area to the south of Kano City.

26. In the northern Emirates the soil is sandy and the wet season is very short. The farming is therefore very extensive, most of the crops are grown on the flat, and generally widely spaced. A certain amount of experimental work is required to ascertain in what directions, if any, our system needs to be modified to suit these conditions. As, for example, whether, with the help of manure, closer spacing could profitably be adopted; and whether flat cultivation is a necessary adaptation to climatic conditions, or whether it is a mere incidental feature of the extensive style of farming. These problems will be studied on the farm centre which is now being started at Daura, and once they are solved, extension work in the northern Emirates can be expected to proceed smoothly. For both the people and some of the Emirs, especially the Emir of Daura, are real farmers.

27. The conditions on the closely farmed area around the city are being carefully studied on the experimental farm at Kano. The chief difficulty is the small size of the farms, and on our own farm we have laid out two small areas which, as far as we can make them, are exact replicas of the native farms of the area. We are studying the economics of milk production under these conditions; assuming that, if it is profitable with paid labour, it will be still more profitable to an independent farmer. The figures so far obtained are encouraging, and the investigation is being continued. But probably the real solution for this area is dry season irrigation from wells by means of bullock lifts. If only a small part of each farm could be watered in the dry season, the wealth of the farmers near Kano would be enormously increased; for they have a market almost at their doors for all the vegetables, sugarcane for chewing, and the like which they could grow with irrigation.

28. The conditions in the area to the South of Kano approximate very closely to those of the greater part of the Zaria Emirate; and it is our failure to make more progress in the south of the Kano Province that is so disappointing. However, although progress is very slow, we do not actually lose ground. Every year there are one or two new farmers who wish to start; while those who have started continue, in spite of the fact that, owing to lack of wet season roads and the absence of a farm centre in this area, supervision is a very difficult matter and we therefore cannot help them as we should do. A farm centre for this area has recently been

approved, and, as already mentioned, there are demonstration farms at Karaye and Rano. We propose this year to make a great effort in this area, to provide adequate demonstration and supervision. It is, however, probable that the factor which has hitherto had most influence in limiting our rate of progress in the Kano Emirate has been the very conservative attitude of the native authorities towards improvements in agriculture—an attitude which is in marked contrast to their progressive attitude towards municipal public works. The problems, pre-occupations and interests of that administration seem to be—perhaps inevitably must be—almost exclusively urban, and most of the native officials of the administration seem to look little beyond the walls of the city. The Emir himself, however, has always had a personal interest in farming; and though he was naturally discouraged a year or two ago when his farm near Kano had to be used for building, he started another farm again this year at a distance from the city. An agricultural officer visits the farm regularly to advise on its management, and, for a first year, the farm has been quite successful.

### The Departmental School at Samaru.

29. Until recently our efforts to train natives of northern Nigeria for work as assistants in the department or as agricultural extension workers under the Native Administration had resulted in very little. Yet this matter is of the utmost importance. The school at Samaru is an essential part of the scheme for developing our extension work in close co-operation with the Native Administration. If the European Superintendent of Agriculture is to act in a purely advisory capacity it is essential that every Native Administration should have a staff of well trained African Assistants to take charge of the farm centres and demonstration farms. In addition to training departmental assistants for our own department, the school therefore also trains pupils for the Native Administrations, indeed the latter class of pupils ought greatly to outnumber the former. The only reason for our slow progress in the past has been the fact that we could get no educated candidates for training; but at last I am able to record that the situation in this matter is more satisfactory and promising. Last year we recruited as pupils for the first time, some young men who had been educated at the college at Katsina, which is the type of pupil for which the school was really created. It is true that this first class consisted of only three young men, but as they promise well, three is very much better than none; and we hope to recruit five or six more this year. One of the three present pupils is earmarked for Kano and is being trained at the expense of that Native Administration. It is hoped and anticipated that in future most of the pupils will be able to obtain scholarships offered by their respective Native Administrations. Several southern ex-pupils trained at Ibadan have done very well in the north; but they meet many difficulties, and senior assistants who are natives of the north are to be preferred even in the department if they are sufficiently efficient. Assistants in the Native Administrations must, of course, be natives of the north. In addition to the two senior pupils, we had also a class of half a dozen boys from middle schools. This class was started rather as a makeshift, as it is considered undesirable at this stage to have many departmental assistants whose promotion later in life is likely to be restricted by the limitations of their non-technical education. However, these boys have come on well, and two or three of them promise well enough to be worth a trial next year in the senior class, although they are not strictly qualified for entry to it. The others will make useful junior assistants. A class has also been formed of

the best of the old type of uneducated assistants who form the lowest ranks of the department and of the agricultural staff in the Native Administrations. These are not boys but men, some with many years' service. As they are only just literate their training has to be restricted to practical work, to writing simple reports in the Hausa language, and to measuring, weighing and keeping simple accounts. By their keenness to learn, which is almost pathetic, they have shown their appreciation of the effort which we have devoted to their improvement. They too will be very useful in their own sphere.

30. It will be realised, from what has been said above, that the schoolmaster who is in charge of this work at Zaria, had a discouraging experience in his early years. But now that he has better material to work upon, I am glad to record that his school promises to become a success. The school farm and the practical work there are especially promising. Unfortunately, the want of perhaps £100 for capital expenditure has delayed our realising the ideal which we have for this farm. That ideal is that the school farm should consist of a series of little farms each of perhaps four acres, complete with its own houses, bullocks, cows and implements, and each worked entirely by a pair of pupils—one in his first year and one in his second—living upon it. But although this cannot yet be arranged, the farm was worked last year entirely by the pupils. They tended the common cattle in turn, and worked, in pairs, their separate plots. There have been no labourers employed on the farm beyond a night watchman; and the land has been well farmed. The buildings are in the native style and are no more than good ordinary buildings of this type, such as a farmer could afford. The equipment and implements are all of the simplest. This is not merely a measure of economy, but is an essential part of our attempt to make the training that is given on the farm thoroughly practical, in spite of taking the pupils as far as possible in their work in the class rooms and laboratories.

### Experimental Work at Kano and Samaru.

31. Experiments bearing on the most profitable ways of using farmyard manure on the comparatively heavy soil of Samaru and on the light soil of Kano have been continued and have extended and confirmed the conclusions mentioned in last year's report. Work has also been continued on the two other matters mentioned last year—intensification of the cropping, and the production of fodder. The latter question is really a part of the former; for the mixed farmer, at his present stage of evolution, will only grow fodder if he can do so without sacrificing any other crop.

32. The bye-product fodders of a peasant's mixed farm are already considerable. For instance the demonstration farm section of our farm at Maigana (*see* paragraph 23), which this year consisted of only eight and a half acres, yielded 4,357 of bye-product fodders—guinea-corn leaves, cowpea straw, groundnut and sweet potato haulms. Now all of these are excellent fodders, and 4,357 lb., at twenty-eight pounds per day, the ration for two bullocks will last for 155 days. Thus this farm yielded enough fodder to feed the two bullocks during the dry weather. When the farm is half as large again, as it should be, the bye-products will provide long fodder for a cow in addition to two bullocks. Again our farm at Kano has this year yielded cotton and groundnuts worth one pound per acre over the whole area of the farm, enough corn to feed all the labourers, and corn and fodder which supported one head of stock per three acres over the whole farm. The question obviously arises, can the supply of straw of the ordinary crops be improved in

quantity or quality without sacrificing the saleable products? It has taken only one year's work to show that it can be so increased, once the farmer has farmyard manure for his crops; and further work will doubtless lead to further advances in this direction.

33. For instance the native farmer, working his farm by hand, plants his guinea-corn surprisingly thinly, and gives each plant some sixteen square feet or so of space. On the heavily manured fields near to the walls of the town or village, the area allowed per plant is commonly much less, sometimes little more than six square feet.

34. In an experiment at Kano the following results were obtained :—

| | Yield of grain per acre lb. | Yield of leaves per acre—lb. |
|---|---|---|
| Average yield of 8 control plots planted 3′ × 3′ 6″ ... ... ... | 1,800 lb. | 1,157 |
| Increased average yield of 4 control plots planted 3′ × 1′ 6″ ... ... | +267 „ | +402 |
| Increased average yield of 4 control plots planted 3′ × 9″ ... ... | + 62 „ | +484 |

35. These results leave no doubt that by planting at say two feet apart on three foot ridges, the mixed farmer can get some 350 pounds more guinea-corn leaves per acre than by planting at his old distances of about four feet by four. He will grow some four acres of guinea-corn; thus as a result of this simplest possible measure of intensification of cropping he will have 1,400 lb. extra fodder of very high quality—enough to provide the greater part of the fodder needed for a cow. The manure made by the cow will, as we know by other experiments, more than compensate for the extra drain on the fertility of the soil. Other experiments at Samaru show that the weight and quality of the guinea-corn leaves as fodder, can be further increased by stripping them from the standing plants some days before the grain is ripe.

36. Again, the ordinary farmer grows a spreading type of groundnut and has the plants very wide apart. Experiments already carried out, but again needing confirmation another year, indicate that a slightly heavier crop can be obtained, both of nuts and haulms, by growing one of the botanist's selected upright groundnuts and planting closer.

37. Again, in most of the Northern Provinces, it is the common, but by no means universal, practice to plant gero (spike millet) and guinea-corn (sorghum) together as a mixed crop on the same land. The corn has to be planted almost simultaneously with the millet. Therefore, although the gero is harvested before the guinea-corn, the two crops are largely competitive; and it is not surprising that we have found by experiment that the yield of two acres of the mixture is very little, if any, greater than the combined yield of two separate acres of each of the crops. With hand cultivation, there is very little in it, either in convenience or yield, whether the crops are mixed or separated. But the man who uses cattle to do his cultivations will find it much better to grow separate fields of each crop, so as to be able more conveniently and efficiently to weed and inter-cultivate the standing crop. An additional advantage is that the gero fields are then available for growing some other crop in the latter part of the season, after the gero has been harvested. Cotton is sown only three or four weeks before gero is harvested; and some preliminary trials, which need a little more confirmation, have indicated that, on manured land, not only does

cotton suffer little through being planted through gero, but possibly even benefits slightly. Land that has grown gero also affords an excellent opportunity for growing fodder, provided that a quick growing plant or mixture of plants is used. This matter is being thoroughly investigated at the experimental stations, and already crops of over half a ton per acre of excellent hay have been reaped of mixtures such as green gram and guinea-corn, or cowpeas and guinea-corn, sown in gero fields after the harvest of the main crop.

38. The matters mentioned, though they are by no means all that are being studied, and although the work on none of them is yet complete, may serve to show what a vista of further advances in farming practice is opened up when once the farmer takes to using cattle for ploughing, and to keeping a cow or two, so as to be able to turn any fodder that he can grow into saleable milk or meat. It is also hoped that the points mentioned are enough to show that the work at our experimental farms in the North is not being neglected, now that extension work outside is progressing. It cannot be over-emphasised that it is the work done on the farms in one year which provides the basis for extension work two or three years later; good farming and sound experimental work at the farms is an essential foundation for all the other work of the department. The devotion of much of the time of several of the best men in the department to that work in the Northern and Southern Provinces is not disproportionate to its importance.

### Work of the Chemical Section: Northern Provinces.

39. In the Northern Provinces the chemist has continued the work mentioned in previous reports, of studying the reason for the remarkably great return on the Zaria soil, from relatively very small dressings of farmyard manure, and the problems cognate to this question. He has also continued his most useful work of analysing the various fodders that are grown by the botanists and on the Samaru farm, and also of the many species of grasses that have been isolated by the botanists, and grown in pure culture. Both these are pieces of work that must be important in the future. As has already been mentioned, the ordinary "mixed farmer" can easily feed his two working animals, perhaps also one cow, in the dry weather on the bye-products of his farm—his guinea-corn leaves and bran, groundnut straw, bean straw, and sweet potato tops, all of which can be made into excellent fodder. He will indeed generally have more of these bye-products than is needed for two animals. But when he comes to have one or two cows and the consequent young stock, then he will certainly wish to grow some fodder—not a great deal perhaps, but half an acre or an acre—to supplement the bye-products. Indeed several farmers are already experimenting in this way, although we have not previously had a satisfactory fodder, that we could recommend as easy and cheap to grow, and as one that can be relied upon to give a good yield of palatable and valuable forage. Again, several of the grasses of the country seem good enough, agriculturally, possibly to repay cultivation by farmers, either by making a small permanent, fenced paddock in which the cattle can graze at least for part of their time, instead of ranging in the bush near the farm, or possibly even by laying small parts of the farm down in rotation to grass for a few years. As far as the native cattle keeper is concerned, such cultivation of grass is clearly some years ahead yet. For a farmer will certainly not be interested in growing grass until he has good cows. But this is a subject which will need several years' study before any reliable conclusions are reached; and

it is our business to keep ahead of our farmer friends. The grasses need to be analysed at different stages of growth, and also as hay and even as ensilage. At present we have to deal with a considerable number of species, many of which will doubtless eventually be discarded for one cause or another. The chemist, botanists and agriculturists are co-operating in all this work both on fodder crops and grasses.

### Work of the Botanical Section in the Northern Provinces.

40. Work on cotton now constitutes perhaps a quarter of the activities of the Northern Botanical Section, and has been mentioned in paragraphs 10 and 11. In other directions the section has done very valuable work, which has, however, hardly reached a stage where I can usefully comment upon it in detail. For instance, in their work with groundnuts, selected strains of the " upright " type have been found, which, on the average of several experiments, have yielded some twenty-five *per cent.* better than local unselected upright groundnuts. And similarly a variety of spreading groundnut has been found that has yielded some seventeen *per cent.* better than the local unselected spreading groundnuts. Both these selected strains represent important achievements; but before we can see our way quite clearly ahead in this matter, these two best types need to be tested the one against the other in several different places. Similarly, the botanists F.B. farafara guinea-corn yielded twenty-five and thirty *per cent.* better in two annual trials than the ordinary local unselected farafara; but the question has now arisen, and must be settled, whether another local type of guinea-corn, " Mori ", which yields better than ordinary farafara, perhaps yields as well as the F.B. The work of the botanical section on grasses, already mentioned in earlier paragraphs, is extremely interesting and valuable; but it, too, has not yet reached any conclusive stage.

### The Irrigated Farm at Sokoto.

41. As was mentioned last year, the officer in charge of our irrigated farm at Kworre, Sokoto, controls the working of the whole of the irrigation scheme there, on behalf of the Native Administration. The success of the scheme has continued to increase. The farmers, though they have still much to learn about their new kind of farming, are steadily becoming more adept in the use of irrigation water, and hence more appreciative of its value. The supply system has been extended in all directions within the bank; but the drainage system still needs corresponding extension and improvement. The abnormally heavy local rainfall this year (1932),—thirty-five inches as against an average of twenty-four inches—caused an accumulation of water within the bank which could not be got away sufficiently; and in consequence, the yields per acre of rice were rather lower than last year, both on our own farm and on most others within the bank. This particular difficulty arises mainly because of the water from the Shalla stream which supplies the dry weather irrigation : it should not occur in an ordinary basin irrigation scheme designed solely for rice growing.

42. In the experiments on the farm, puddling and transplanting again gave much heavier yields than the ordinary native method of growing rice; and the value of the crop on the puddled land covered the cost of production. Now, if a field is puddled, the rice must be transplanted, not sown; but there is no reason why plants should not be transplanted into land that has not been puddled, if there were any advantage in so doing. Experiments were therefore made to investigate this point; but they show that

transplanting, by itself, on land that is not puddled, is not advantageous; indeed it gave yields inferior to those obtained by broadcasting in the native way. One or two of the native farmers within the bank seem to be beginning to contemplate giving a trial to our system of puddling and transplanting.

43. Experiments with farmyard manure, applied directly to the rice fields, resulted in no appreciable increase in the yield of the crop; but when the manure was applied, even in a relatively light dressing, to the nursery in which seedlings were raised for transplanting, then there was a marked increase in the yield per acre subsequently obtained from the transplants. Since the area of a nursery is small as compared to the area of the field planted with transplants from the nursery, the result of this experiment seems to be very promising, and it will be tested again and followed up.

### Rice Mill at Sokoto.

44. Three hundred and three tons of paddy were milled during the season 1931-32, and it is estimated that the loss on working in that season was only £9 15s. 0d. But so much difficulty was found in disposing of the rice, that paddy purchases were restricted to 120 tons in 1932-33; and renewed efforts have been made to produce a more saleable product. A sample sent to me a few days ago of rice prepared by the latest method is the first that has been produced that has been really comparable in appearance to imported rice. The officer in charge of the mill has had to work this process out for himself, finding little aid in the experience of other countries, owing to the peculiar nature of the local rice. His success is the reward of initiative, patience and hard work. Purchases of paddy for the mill in future seasons will depend upon the amounts of rice that can be sold.

### Benue and Ilorin Provinces.

45. In both the Benue and Ilorin Provinces, the necessity for economy has forced us to reduce staff and expenditure to the absolute minimum that is consistent with our maintaining a foothold at all. Only one officer is stationed in each province, with no regular relief. Experimental work has been suspended in the Benue Province; but extension work in the use of green manure is being continued with some degree of success. A small herd of dwarf cattle is being maintained and they are being tried in the plough. At Ilorin the extension work is green manuring has met with discouragingly little response. The situation may be changed if either the selected Popondo bean, which appears so promising at Ibadan (*see* paragraph 47 hereafter), or the Madagascar bean, which has done fairly well in the north, should succeed at Ilorin. But as the matter stands at present, it is clear that, in spite of the excellent returns obtained from the use of Mucuna in Ilorin, both on our own and native farms, yet to try further to encourage its use in this province, would seem to be merely to " flog a dead horse." At the beginning of 1933, a complete change of policy was therefore made in the management of our Ilorin farm. Green manuring was discontinued, cattle obtained, and we began ploughing and making farmyard manure. Any extension of mixed farming in the province must always be limited to such areas as are free, or practically free, from tsetse. The necessity of including the yam among the crops grown necessitates a modification of the methods of cultivation with bullocks evolved in the north; for to obtain maximum yields we know that yams must be grown on big ridges. Our policy is merely to cultivate our own farm with cattle, to maintain its fertility with

farmyard manure and sheep manure, and to make, for the present, no attempt whatsoever to induce any native farmers to follow our example. Only if and when, eventually, some few native farmers do come forward entirely of their own initiative, will we embark on a full programme of mixed farming experiments and extension work, even if funds are available. So far, it can be said that the ploughing is attracting much interest; and there are one or two men whose interest may eventually prove to be more than a natural casual curiosity about the latest symptom of the white man's lunacy.

### Green Manuring and Beans.

46. Extension work in the use of mucuna as a cover crop and green manure for the maintenance of the fertility of arable land has continued with some success in the Benue, Abeokuta and Oyo Provinces. Progress is very slow, and the exceptionally dry weather this year greatly hindered the work in the Western Provinces. Some encouragement can be found in the results of our efforts in each of these provinces and especially in the Benue Province. There is as yet no cause to despair of eventual success in any of these three provinces. As an example of the kind of work that is being done in this direction, work at Meko in the Abeokuta Province may be quoted. There it was suggested to two farmers, who were old friends of the department, that they should allow us to divide a field for each of them into two, that they should grow mucuna under our supervision on one of the halves of each field, at the latter part of the season in 1930-31, and follow it by early maize in 1931-32. The yields of the two half fields were not weighed, nor the grain thrashed under supervision, but the quantities of ears were measured with baskets so that the farmer could see the results. The results were as follows :—

FARM A.

$\frac{1}{2}$ acre maize following Yams and Mucuna, $13\frac{1}{2}$ baskets=1,600 lb. per acre.

$\frac{1}{2}$ „ „ „ Yams, no Mucuna, $6\frac{1}{2}$ baskets=730 lb. per acre.

FARM B.

$\frac{1}{3}$ acre Maize following Mucuna, 5 baskets = 660 lb. per acre.

$\frac{1}{3}$ „ „ „ Bush fallowing, 3 baskets = 390 lb. per acre.

The weights given are rough estimations of the yield of grain per acre based on the approximate weight of a basket of ears. The land in the second experiment was poor land that had been allowed to go out of cultivation. Both farmers are willing to make further trials next year.

47. It was realised at the beginning that success in the Western Provinces would be difficult to achieve unless a bean could be found which, planted as a " catch crop " in the latter part of the season, would serve to maintain fertility, and at the same time yield a small crop of locally edible, or, better still, exportable beans. The experiments with mucuna were regarded chiefly as a means of studying the subject while awaiting the finding or production of a better bean. Very numerous types of bean obtained from other countries were tried; indeed it is no exaggeration to say that, so far as we know, we have tried every well known bean in the world in this way; but without any success. All of the local Nigerian and Cameroon varieties of beans either have a coloured skin or develop a dark colour when boiled. They are thus unsuitable for export and not very attractive for local consumption. Generally also,

they give too light a cover to serve as soil improvers, and too small a yield of beans per acre to be a profitable money-crop. Eventually we have found a single plant selection of a local bean—" Popondo ", a type of *Phaseolus Lunatus* which, alone among hundreds examined, has all the necessary properties of forming a good cover, yielding at least a fair crop of beans without being " staked ", and yielding a bean which is white and does not go dark on boiling. By this year it had been multiplied to a scale large enough for its yield per acre to be judged. In one experiment six quarter-acre plots of beans planted through yams yielded, on the average, 574 lb. per acre, and another of three quarter-acre plots of beans through early maize gave an average yield of 764 lb. per acre. As the local value of the beans will, it is hoped, be about a penny per pound, these figures represent a reasonable return for a late sown catch crop. The effect of this " Improved Popondo " in maintaining fertility is being tested at Ibadan against mucuna. The result will not be certainly known until the test crop is ripe in a few months' time, but to judge by the present appearance of the young test crop of maize, it appears to be superior in this respect to mucuna. It even appears possible that the Improved Popondo, when allowed to grow until ~~November~~ (as is necessary) and then burnt, will give a superior result to mucuna buried green in ~~February~~, which we have already proved conclusively to be the best treatment for mucuna. If this proves to be the case we can expect the growing of the " Improved Popondo " to be taken up readily, with very great benefit to the local agriculture. We have not yet been able to spare enough beans for a real trial of its export value; but a fairly encouraging report was obtained a year or two ago upon a very small sample. At the worst, the bean will almost certainly be more popular than anything of the kind which is grown at present for local consumption.

February
November

### Green Manuring in the Eastern Provinces.

48. As has been explained in previous reports, the position in the Eastern Provinces is very different to that in the West. There, in contrast to Ibadan, we have not yet succeeded in finding a green manure crop that will grow strongly enough to maintain fertility, even on our farm at Umuahia, which may be classed as average land of that part of the country. Still less have we found any crop which would serve to improve the very worst soils there, which are so poor and acid that they will not even grow weeds. During the last year or two, we have therefore been trying several newly imported species of Crolataria, Tephrosia and Mimosa both on our farm and, with the co-operation of various farmers, on poorer land outside. Results have been obtained which though as yet inconclusive are encouraging, and this work is being continued and extended. It is also gratifying to record that, by the use of lime, a really satisfactory crop of maize has on the farm at Umuahia been obtained from land on which crops had failed for the previous two or three years. It seems to call for a rather long sighted and optimistic view to forsee a time when the people of that area would buy quicklime to put on their land. However, the proximity of both limestone and coal to the Eastern Railway should make it possible for lime to be produced at a fairly reasonable rate; and, if the soil can once be made more fertile, green manuring, possibly with an application of lime once every few years, would probably keep up fertility. These liming experiments are being continued and extended. The food crops of that part of Nigeria give such poor yields per acre, that any measure that offers the slightest promise is obviously worth thorough investigation.

The soil chemist at Ibadan is co-operating in this work, and giving valuable help therein, while Rothamsted has undertaken to examine the bacterial content of samples of soil sent to them. It has been found by that institute, that in the normal unimproved state these soils are very nearly devoid of any bacterial population at all, and of any nitrifying power. In view of the chemical and biological data about these soils, the remarkable thing is not that they yield poor crops, but that anything at all is able to grow upon them. These facts also emphasise what a remarkable plant the oil palm is to flourish on these soils.

### Cotton in the Southern Provinces.

49. The export of Ishan cotton from the Southern Provinces fell from 6,000 bales in 1929-30 to 1,300 bales in 1931-32 and only about the same quantity is expected to be exported in 1932-33. A heavy fall in 1931-32 was expected: it was a natural result of the falling price. But it is disappointing that there has been no recovery in the season of 1932-33. Cotton, to the southern farmer, is generally only a catch crop which he plants in early maize or yams, just before they ripen, in order to use his land profitably after the main crops have died off. The competitors to cotton in this field are beans and cowpeas, which give only a very small yield per acre, and late maize, which will only give a good yield on very good soil. There are annually many fields of early maize and yams which grow nothing except weeds in the latter part of the season. To plant cotton in such fields costs the farmer only the labour of planting, which is very small, that of one or two light weedings, and the trouble of picking and marketing the crop. Southern farmers complain that they are very poor now, because of the low prices of kernels and cocoa and the cheapness of foodstuffs. Even with cotton at its present price, it is therefore difficult to understand why so little was grown this year: for it is not merely that the yield per acre was small or that little of the crop is being sold for export: the cause of the small export is simply that little cotton was planted.

50. The weather during the planting and growing season of 1933 was quite abnormally dry. There has not been such a season since, apparently, some thirty-five years ago, and certainly not during the twenty-seven years' history of the farm at Moor Plantation, Ibadan. On our farm, we, making the maximum use of one timely rain, planted all our cotton successfully; but it was so long before our fields were again well soaked that the " supply seed " sown in the gaps in the original " stand " failed to produce useful plants. Very few farmers plant cotton quite so early as we do; and, moreover, some districts were undoubtedly less favoured by timely rain than we were: any farmer who missed the first opportunity to plant had lost his only chance. Thus the unusual weather alone is perhaps enough to explain so small an area of cotton being planted, even if farmers had intended to plant a considerable area: and indeed, from what we are told, it does seem that if the weather had been normal there would have been some considerable export this year.

51. There still seems every reason to suppose that even a slight improvement of the price of cotton for export, perhaps even its mere maintenance at the present level, will cause a rapid revival of the industry in the Southern Provinces. As regards our departmental work, we are therefore continuing steadily with our programme, with but slight quantitative reductions of the scale of

our efforts. We are maintaining our regular routine system for the multiplication of selected seed of the present strain " Ishan A " though at a somewhat slower rate. That system is necessary in order to maintain the present standard of quality, even if it does not lead to a further gradual slight improvement. The cotton breeder is also steadily continuing his work of selection among his artificial crosses of the hardy high yielding strain " A " with less hardy strains of higher quality, both of Ishan cotton and of Sea Island (the latter supplied by Dr. Harland of the Empire Cotton Growing Corporation). The hope in both lines of work is, of course, to fix a strain having the desirable properties of both types. This is necessarily slow work, and as yet it is only possible to say that the inter-Ishan crosses are promising very well so far. The history of cotton growing in the Southern Provinces in the last few years has again confirmed the general policy on which all our work on cotton in the south is based. To be grown here at all, a cotton must be vigorous enough to succeed when interplanted with other crops, including yams, and it must be hardy against our many insect pests and fungus diseases. Given all that, any improvement of quality, however slight, greatly helps the industry, especially in hard times like the present when the world price of cotton is depressed. This applies even to such an improvement as would raise the value of the seed-cotton by one-eighth of a penny per pound : a new strain worth, in these bad times, a premium of one farthing per pound of seed-cotton might totally alter the outlook.

52. For similar reasons, the system of grading seed cotton at special cotton markets has been continued. Also, since the old standards had proved to be unnecessarily low for this improved Ishan cotton, a new and higher standard was fixed by regulation for the first grade, and we have tried to enforce it strictly. The effort was not entirely successful at the beginning of the 1932 season, but strict grading to the new standard was attained before the end of that season and is being maintained in the current season. This increased strictness has naturally reduced the proportion of the crop that passes in the first grade as the following percentage figures show :—

| | *Grade I.* | *Grade II.* | *Grade III.* |
|---|---|---|---|
| 1931 ... ... | 97% | 3% | Less than 1% |
| 1932 ... ... | 16% | 38% | 46% |

But there is really no reason why there should be any appreciable proportion of second grade cotton at all. The chief cause for it is that in the south the farmers will always leave all the cotton on the plants until the end of March or even April, so as to pick the whole crop at once, instead of picking two or three times at intervals during the season, as the Northerner does. Cotton picking is not laborious work, when the total area grown by a family is only an acre or so : to pick only once is really nothing less than thoroughly slovenly farming. [It should be mentioned that the farmer is not to be blamed for this practice : for twenty years he was, in effect, encouraged to do this; for, for all those years, there was only one price for southern cotton, never mind how clean or how dirty it might be, so that the farmer might as well pick once as several times.] If the farmer would just pick his cotton even twice instead of once, without taking any extra trouble, at least the first picking would probably pass at first grade. If he would also take very little extra trouble to pick the badly damaged separately from the clean, then generally over ninety *per cent.* of his crop would be first grade. We have sold, at cost price, several hundred cheap

cotton picking bags divided into two compartments, and have conducted propaganda about this subject. The bags sell readily and there has been some distinct extension of clean picking; it is hoped that when the industry revives there will be a fair proportion of first grade, and that that part of the crop will be really clean.

53. At the moment, in all our cotton work, it must appear as though we were flogging a dead horse; but I still think that it is only a sleeping horse. We have now, in the Ishan A, a cotton of high quality, and farmers agree that it is, if anything, hardier and heavier yielding than their old indigenous cotton. As stated above, there is a very fair prospect that the cotton breeder will be able to improve on Ishan A. I do not doubt that if ever the price of cotton rises slightly, cotton will again become a more important crop in Southern Nigeria than it has ever been before. We shall then reap a reward for this work, which seems so thankless at the moment. The following tables give the exports of Ishan and native cotton from the Southern Provinces in recent years, and the prices in each year :—

| | Native Cotton. | | Improved Ishan. | |
|---|---|---|---|---|
| | Bales. | Prices.* | Bales. | Prices.* |
| 1927–28 | 4,546 | 1⅝d. rising to 2⅛d. ... | 68 | 2⅝d. rising to 3¼d. |
| 1928–29 | 6,501 | 1⅞d. falling to 1⅝d. ... | 939 | 2½d. falling to 2¼d. |
| 1929–30 | 3,510 | 1¼d. falling to ⅝d. ... | 6,026 | 1⅝d. falling to ⅞d. |
| 1930–31 | 312 | ⅝d. falling to ⅜d. ... | 4,289 | ¾d. falling to ⅝d. |
| 1931–32 | 4 | ½d. falling to ⅜d. ... | 1,333 | ¾d. falling to ⅝d. |

* The prices are those of second grade Native seed cotton per pound and first grade Ishan.

## Oil Palm Planting.

54. The following tables give the statistics of native owned small Oil Palm Plantations :—

## NATIVE OWNED PALM PLOTS.

| YEAR. | Number of New Owners. | | | | | | | Number of Extensions by Previous Owners. | | | | | | | Acreage (Approximate.) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Benin. | Warri. | Owerri. | Calabar. | Onitsha. | Abeokuta. | Total. | Benin. | Warri. | Owerri. | Calabar. | Onitsha. | Abeokuta. | Total. | Benin. | Warri. | Owerri. | Calabar. | Onitsha. | Abeokuta. | Total. |
| 1928 ... ... | ... | ... | 3 | 2 | ... | ... | 5 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 9 | 7 | ... | ... | 16 |
| 1929 ... ... | ... | ... | 5 | 15 | ... | ... | 20 | ... | ... | ... | 2 | ... | ... | 2 | ... | ... | 48½ | 39 | ... | ... | 87½ |
| 1930 ... ... | 18 | ... | 1 | 5 | ... | 1 | 25 | ... | ... | 4 | 5 | ... | ... | 9 | 63¼ | ... | 18½ | 32 | .. | 2½ | 116¼ |
| 1931 ... ... | 19 | 1 | ... | 2 | 4 | 2 | 28 | 3 | ... | 3 | 7 | ... | ... | 13 | 48¾ | 1¾ | 10½ | 14 | 29 | 1½ | 105½ |
| 1932 ... . | 80 | 15 | 12 | 12 | 3 | ... | 122 | 19 | 1 | 3 | 6 | 1 | ... | 30 | 198 | 44½ | 33 | 21 | 7½ | ... | 304 |
| Total ... | 117 | 16 | 21 | 36 | 7 | 3 | 200 | 22 | 1 | 10 | 20 | 1 | ... | 54 | 310 | 46¼ | 119½ | 113 | 36½ | 4 | 629¼ |

### Oil Palm Planting—Benin and Warri Provinces.

55. As the figures above show, very satisfactory progress has been made in palm planting. Statistically, by far the greatest progress has been made in the Benin Province. Until the beginning of this year an old native court rule in the Benin Division had been erroneously interpreted in a way which had the practical result that no man or family could plant palms on his or their own land without the special specific permission of the native authority. When that position was satisfactorily cleared up and the restriction removed, the late Oba became a whole-hearted supporter of palm planting. The helpful attitude of the Lieutenant-Governor, Southern Provinces, and the Administrative Officers in the provinces—the attitude of very benevolent neutrality which is all that is desirable—has been a factor of great importance. Of still greater importance is, of course, the fact that the people in Benin Province can now see, at our farm and at the various outside extension trials, the high and early yields given by the trees in palm plantations. Work in the Warri Province has also progressed well during the year. It must, however, as yet be regarded as at an earlier stage if not indeed on a less certain or more experimental basis than the work in Benin. In Benin the use of land is perhaps more generally and definitely individual than in most parts of the Southern Provinces, and there is a corresponding spirit of individual enterprise. In parts of Warri, on the other hand, the local conditions apparently entail that palm plantations, if they are to be made at all, must, at present, be made communally. Now there is a considerable history of previous communal efforts of a similar nature in various provinces, and the results have been such as to justify a conclusion that attempts to make communal plantations always fail. However, the conditions in Warri seem to be exceptionally favourable for communal plantations, to a degree that at least justifies another trial. It is too early yet to say what the result will be; but the two communal palm plantations which have been established have been fairly satisfactorily maintained during the first season.

### Owerri and Calabar Provinces.

56. The progress that has been made this year in Owerri and Calabar, while statistically much inferior to that in Benin, really represents a still greater achievement. The people of most districts of these two provinces have throughout been extraordinarily suspicious of our activities. Not unnaturally, they cannot see why we should desire to help solely for their own benefit, and are therefore firmly convinced that even the suggestion that they should themselves plant palms on their own land must somehow be the first step in some deep laid plan which will eventually lead to Government taking their land from them. So strong has this sentiment proved, that repeatedly individuals or families have decided to try planting palms, but have later given in to the strong adverse public opinion of their neighbours. In some districts and even divisions we have not yet been able to get even one tiny plot of palms planted by any farmer. And it is in these areas, with their heavy populations of trees and palms, that the matter is of most urgency. This is not merely because this is the " palm belt " *par excellence*, nor even merely because neither the people nor ourselves know of any other export crop which will succeed on these poor acid soils. A more important reason for the urgency of this work in these areas lies in the poor food crops that the poor soil yields and their inadequacy to feed such a heavy population. If the yield of the areas that are occupied by palms could be doubled, as they easily could by the substitution of plantations for wild trees and groves, then either more land would be available for food crops or much

more money would be obtained wherewith the people could purchase food imported from other parts of Nigeria or from abroad. That so much progress has been made is thus very gratifying and is a tribute to the work done among the people by the officers concerned, both agricultural and administrative. There is every promise of greater advances this year (1933) and progress will now be rapid. An important factor in this achievement is undoubtedly the fact that visits of parties from many areas to our farms have been organised by several divisional officers and these parties have been much impressed by what they have seen. Another important factor has been the good work of some of the assistants trained at the Ibadan school. Most important of all has been the tactful and careul work of the agricultural officer in charge of this extension work, who, having now had charge of the work for some years, has been able to make some friends in every division of the two provinces.

### Oil Palm Planting in the Western Provinces.

57. Efforts to extend palm planting in the Western Provinces—Oyo and Abeokuta—have met with little response, owing to the people's preference for cocoa and kola. But two or three plantations have been made, and there is a possibility of some more being made in the near future. The first one established was a plantation of two and a half acres made at Loburo in Abeokuta Province by the Alake himself on his own family land. This was planted in 1930 with one-year-old seedlings from Ibadan and already, that is in less than three years from planting and in less than four years from the seed, a few of the trees have yielded fruit. In a year's time many of them should be yielding. This plantation has generally been satisfactorily tended, and is now a good young plantation. Plantations have been established by individuals in the Ibadan division of Oyo Province during the past year.

### Palm Grove Replacement Experiments.

58. The nature of our experiments in improving old groves of palms has been described in previous reports. The operation might perhaps more accurately be called one of replacing palm groves by plantations of palms on the same land. In my last annual report, especially, these experiments were dealt with in considerable detail. The idea is that where there is bush which contains a considerable number of palms, there, instead of completely clearing away both the bush and the old palms in order to plant seedling palms, some of the old palms are left so that the land may continue to yield a profit while the young palm seedlings are growing up. Little or no stumping is done; and the treatment of the young palms consists only of fairly frequent ring weeding, with an occasional rough outlassing of the weeds and regrowth of bush over the whole area. The old palms should be cut out gradually, as fast as appears to be necessary, in order to allow ample light to reach the young seedlings. Each particular area has to be treated on its merits according to the condition and age of the old palms. The ideal is to leave only very old high palms to the number of thirty to forty per acre at first, not fifty as we thought when we first started this work. Such old high palms yield heavily, though they do not give any greater yield after the bush has been removed from between them than they did before. Younger palms, less than thirty or perhaps thirty-five feet in height, give a considerably increased yield after the bush between them has been cleared away; but they greatly hinder the growth of the seedlings. The experiments at Aba are on land expropriated by Government in the town planning scheme. The others are in groves which were the property

of ordinary native families, who were persuaded to let us carry out the work, and indeed have done much of it themselves; the trees and produce naturally remain their property. In most instances, the owners would not agree to our cutting out so many old palms as we wished; in some cases they would not even agree with us about the type of palm that should be left; nor agree to the removal of certain bush trees, other than palms, that have some small economic value. Naturally their wishes could not be over-ridden, and the palm seedlings have suffered accordingly. Moveover, when we started the experiments we did not know, as we do now, exactly the best way of doing the work. In spite of all these shortcomings in the experiments, the figures given in the table below show how sound and profitable a proceeding this grove replacement is.

## SUMMARY OF YIELDS.

*TABLE NO. 1.*

### Palm Grove Replanting Experiments.

| | | Yields of Bunches per acre. | | | | | Remarks. |
|---|---|---|---|---|---|---|---|
| | | 1928. | 1929. | 1930. | 1931. | 1932. | |
| | | Lb. | Lb. | Lb. | Lb. | Lb. | |
| Akpabuyo A ... | 6 plots, each 1 acre, in bush ... ... | 2,081 | 2,145 | *1,506 | 1,593 | 2,555 | An average of 19 old trees per acre were left in the cleared plots in 1928. 90% of these were between 30 and 36 feet in height and they were stout trees with big leaves. The old trees should be removed now but the owners will not consent. |
| | 5 do. 1 do. cleared... ... | 3,043 | 4,231 | *2,320 | 4,127 | 4,550 (2,264)† | |
| Akpabuyo B ... | 6 do. 1 do. in bush ... ... | 2,388 | 1,828 | *1,151 | 2,102 | 2,505 | |
| | 5 do. 1 do. cleared... ... | 2,550 | 3,307 | *1,922 | 3,812 | 4,620 (2,078)† | |
| Akpabuyo C ... | 5 do. 1 do. in bush ... ... | 1,086 | 1,002 | *909 | 1,407 | 1,415 | |
| | 4 do. 1 do. cleared... ... | 1,464 | 2,664 | *2,040 | 3,392 | 3,836 (1,337)† | |
| Ikparakwa A ... | 4 do. ½ do. cleared 1932 ... | 2,120 | 3,058 | 3,360 | 3,712 | 2,759 | An average of 65 trees per acre were left in the cleared plots, all over 25 feet in height and 60% of them over 35 feet. The have been gradually reduced to 10–20 per acre on the cleared plots. |
| | 3 do. ½ do. cleared 1927 ... | 3,150 | 4,696 | 4,842 | 3,702 | 2,731 (25)† | |
| Ikparakwa B ... | 3 do. ½ do. cleared 1932 ... | 2,428 | 2,534 | 3,490 | 3,498 | 2,345 | |
| | 3 do. ½ do. cleared 1927 ... | 3,030 | 2,897 | 3,780 | 2,826 | 1,881 (2)† | |
| Azumini ... | 5 do. ½ do. in bush ... ... | 1,410 | 2,704 | 2,330 | 3,074 | 3,546 | An average of 26 trees per acre were left, 60% of which were between 20 and 40 feet high, the remainder smaller. They have not been reduced to 14 per acre on the average. |
| | 4 do. ½ do. cleared... ... | 1,844 | 2,531 | 3,068 | 3,128 | 4,263 (1,132)† | |
| Aba A ... ... | 5 do. 1 do. in bush ... ... | 457 | 697 | *605 | 1,022 | 1,266 | An average of 44 trees per acre were left, most of which were under 20 feet in height and practically none over 35 feet. Reduced to 14 old trees per acre on the average by the end of 1932. |
| | 4 do. 1 do. cleared... ... | 1,035 | 2,148 | *2,279 | 2,851 | 2,271 (119)† | |
| Aba B ... ... | 5 do. 1 do. in bush ... ... | 1,401 | 1,748 | *1,475 | 2,469 | 2,447 | |
| | 4 do. 1 do. cleared... ... | 2,259 | 3,007 | *3,133 | 4,292 | 3,750 (58)† | |
| Aba C ... ... | 5 do. 1 do. cleared 1931 ... | 1,333 | 1,456 | *1,334 | 2,769 | 3,476 | |
| | 4 do. 1 do. cleared 1928 ... | 1,399 | 2,653 | *3,087 | 4,117 | 3,773 (167)† | |
| Orlu ... ... | 4 do. ½ do. cleared 1932 ... | 1,053 | 1,130 | *538 | 2,732 | 2,120 | 54 trees per acre were left on the average, mostly between 20 and 40 feet in height, but they were poor trees with small leaves. |
| | 3 do. ½ do. cleared 1928 ... | 1,559 | 1,846 | *1,140 | 3,482 | 3,329 (nil)† | |
| Ekiadolor (Benin Province) | 5 do. 1 do. in bush ... ... | ... | ... | 1,847 | 2,515 | 2,698 | By the end of 1932 the old trees in the cleared area had been reduced to 18 per acre. They are mostly of medium height. |
| | 4 do. 1 do. cleared 1929 ... | ... | ... | 2,571 | 3,838 | 3,371 (938)† | |

* These figures are unreliable owing to imperfect or unrecorded harvesting having occurred in these series of experiments in 1930.

† The figures in brackets give the yields per acre of bunches from the young planted palms, which are now beginning to bear.

59. Whereas the palms planted in ordinary plantations have recently been coming into bearing in the third or fourth year after planting, the young palms in these grove experiments (except at Akpabuyo and Ekiadolor) have yielded little or nothing until the fifth year, and some not even then. This difference is due however, not so much to the competition of the original palms, as to the fact that the seedlings which were planted out at first were much too small, and consequently died or were destroyed by rats, and had to be replaced. We have since learnt that palm seedlings should be of a considerable size before they are planted out. If they are raised from seed they should be transplanted early from the germinating bed to a nursery in which they are planted at two feet apart, and should remain there for some eighteen months or so, until their leaves are about four feet long. When selected wild seedlings are used, they may even be a little bigger. At first we made the mistake of planting out very young seedlings, often even without any divided leaves at all.

60. It will be seen that the series of experiments include very different kinds of palm bush or "groves". The results obtained in these early years differ with the different types of bush; and the progress of the seedlings has been inversely proportional to the shading, to which they have been subjected. Allowing for the early mistakes already described, and allowing for the differences of climate and soil at the different places, it may be said that the seedlings are very little, if anything, behind "straight plantation" seedlings of the same age. Only at Ikparakwa has there been any loss of yield on the cleared plots as compared with the uncleared plots. And even at Ikparakwa the loss has only been at all serious in one of the two series of plots. Even on that series the yield of the young palms will soon make up for the relatively smaller yield of the old palms in the last two years, and the owner will then have, in effect, a young plantation that has cost little in labour and nothing in any other way. In all the other series, the increase in the yield of the older trees after clearing has directly and immediately given a handsome return for the work done; and the considerable capital value of the planted palms is thus clear profit.

### Palm Grove Replacement Extension Work.

61. The following figures show the progress made in the extension of palm grove replacement by native owners :—

## PALM GROVE REPLACEMENT—NATIVE OWNED.

| Year. | Number of New Owners. | | | | | | Number of Extensions by previous owners. | | | | | | Acreage (approximate). | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Benin. | Warri. | Owerri. | Calabar. | Onitsha. | Total. | Benin. | Warri. | Owerri. | Calabar. | Onitsha. | Total. | Benin. | Warri. | Owerri. | Calabar. | Onitsha. | Total. |
| 1928 ... ... ... ... | ... | ... | ... | 1 | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 5 | ... | 5 |
| 1929 ... ... ... ... | 1 | ... | ... | ... | ... | 1 | ... | ... | ... | 1 | ... | 1 | 4 | ... | ... | 7 | .. | 11 |
| 1930 ... ... ... ... | ... | ... | ... | 1 | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | $1\frac{1}{2}$ | ... | $1\frac{1}{2}$ |
| 1931 ... ... ... ... | ... | ... | 1 | 3 | ... | 4 | ... | ... | ... | ... | ... | ... | ... | ... | 5 | 5 | ... | 10 |
| 1932 ... ... ... ... | 9 | ... | 1 | 1 | ... | 11 | ... | ... | ... | 1 | ... | 1 | $27\frac{1}{4}$ | ... | 2 | 5 | ... | $34\frac{1}{4}$ |
| Total ... ... | 10 | ... | 2 | 6 | ... | 18 | ... | ... | ... | 2 | ... | 2 | $31\frac{1}{4}$ | ... | 7 | $23\frac{1}{2}$ | ... | $61\frac{3}{4}$ |

62. As will be seen from the figures given, there has as yet been much less progress in the adoption of our " Grove Replacement " plan by native owners than there has been in the making of " straight plantations " on land where there were no palms before. The reason for this difference is that, even in the greatest strongholds of communal land tenure, there are some few individuals, or families in a narrow sense, who have quite clear individual rights of tenure of their " farm land ". It is these individuals and families that have planted palms. Apart from these exceptional individuals who have clear rights, there is in many places, though not everywhere, some degree of recognition of the right of individuals or families to use their farm land as they like. The communal idea, however, still applies in its entirety to nearly all palm groves; and it is difficult to find groves that are owned by communities that are small enough for any enterprise to be feasible. Even when a majority of the community agree to improve their grove, a small minority's disagreement with the proposal will make it impossible for anything to be done. This has occurred repeatedly. However, it must be remembered that all these difficulties will undoubtedly be overcome by the people themselves in time if they become really convinced of the desirability of the change. To cut down palms, as " Grove Replacement " necessitates, is much more foreign and objectionable an idea to the native mind than is the idea of planting palms; and this strong prejudice will only be overcome when it is realised how much more profitable well spaced young palms are than are the trees in an untended grove. There is still a year or two to wait for that. The low prices of oil and kernels in recent years have not made this part of our work any easier, but in spite of all difficulites, there is a prospect of more progress next year than hitherto.

63. We are, naturally, just as willing to help farmers or families who wish to make straight plantations as ones that propose to " replace groves ". But it would still seem, in spite of the more rapid progress in the making of plantations, that the grove plantations, that the grove replacement may eventually be the more important in the Eastern Provinces. Speaking generally and broadly, the people of the " Palm belt " have already not enough land for food crops. If they start generally to plant palms on their farm lands, they will have to cut down the groves and use that land for farming. Such a change-over might not compare quite so badly with grove replacement as might be thought: for ordinary farm crops can be, and are, grown between the young palms on a " straight plantation " for two or three years, whereas the shade from the old palms in groves under direct replacement (as in the experiments mentioned above) is too heavy for anything except cocoyams to be grown between the young palms. Perhaps an interchange of the farm land and palm land may be the solution which the people will eventually adopt to get round the difficulties to which communal tenure gives rise. It would be a radical change, but it would serve the purpose. Our grove replacement experiments and extension work show that it is not the only way by which the people can provide themselves with palm plantations, nor is it probably the most economical way. I say " probably ", because any calculation of the profits and costs of the two methods would be of too theoretical a nature to be useful.

## Palm Oil Presses.

64. It was explained in last year's report that, after long and thorough experimental trials, it had been decided to demonstrate and recommend the Duchscher Palm Oil Presses instead of the English makes previously recommended. It was also explained

how the placing of the orders for a few presses for demonstration had been deliberately delayed for a week or two because of the fluctuating exchange. Further longer delays arose while it was further discussed whether it was permissible for us to demonstrate a foreign press. Efforts were made by the Crown Agents and others to obtain quotations for a press of British make that would compete in quality and price with the Duchscher. These efforts having failed we started public demonstration of the Duchscher press late in August, 1932, and the agency was taken up by a local firm who sell the press at alternative cash or hire purchase prices. The firm have given us, and continue to give us, the fullest details of their costs and we are satisfied that their selling prices are reasonable. The Onitsha Native Administration has also undertaken sale on the hire purchase system in that province. The number of presses sold between September, 1932, when sales began, and February, 1933, inclusive, are shown in the following table :—

TOTAL SALES OF DUCHSCHER PRESSES TO FEBRUARY 28TH, 1933.

| Area. | | Large Press. | Small Press. |
|---|---|---|---|
| Onitsha ... ... ... | For Cash ... ... | 1 | ... |
| | Hire Purchase ... | 7 | 3 |
| Umuahia ... ... ... | For Cash ... ... | 4 | 1 |
| | Hire Purchase ... | 2 | 3 |
| Western Provinces ... ... | For Cash ... ... | ... | ... |
| | Hire Purchase ... | 1 | ... |
| Total ... ... ... | For Cash ... ... | 5 | 1 |
| | Hire Purchase ... | 10 | 6 |
| Total ... ... ... | ... | 15 | 7 |

## 65. CO-OPERATIVE SALE OF FERMENTED COCOA.

| | Oyo Province. | Ondo Province. | Cameroons. | Ijebu Province. |
|---|---|---|---|---|
| Total number of active members of societies :— | | | | |
| 1929-30 ... ... | ? | ? | 750 | ... |
| 1930-31 ... ... | 278 | 450 | 766 | ... |
| 1931-32 ... ... | 337 | 511 | 862 | ... |
| 1932-33 ... ... | 616 | 682 | 1,100 | 150 |
| Total quantity of cocoa produced, tons :— | | | | |
| 1929-30 ... ... | 155 | 158 | 188 | ... |
| 1930-31 ... ... | 222 | 197 | 132 | ... |
| 1931-32 ... ... | 313 | 253 | 158 | ... |
| 1932-33 ... ... | 471 | 501 | 250 | 67 |
| Quantities per member, tons :— | | | | |
| 1929-30 ... ... | ? | ? | ·25 | ... |
| 1930-31 ... .. | ·80 | ·44 | ·17 | ... |
| 1931-32 ... ... | ·93 | ·50 | ·17 | ... |
| 1932-33 ... ... | ·76 | ·74 | ·22 | ·44 |
| Proportion of grade 1 cocoa, *per cent.* :— | | | | |
| 1929-30 ... ... | 59 | 66 | ... | ... |
| 1930-31 ... ... | 93 | 72 | ... | ... |
| 1931-32 ... ... | 88 | 97 | ... | ... |
| 1932-33 ... ... | 97 | 98 | ... | 90 |

| | Oyo Province. | Ondo Province. | Cameroons. | Ijebu Province. |
|---|---|---|---|---|
| Total cash received :— | £ | £ | £ | £ |
| 1929–30 ... ... | 4,803 | 4,958 | 5,504 | ... |
| 1930–31 ... ... | 4,064 | 3,436 | 2,398 | ... |
| 1931–32 ... ... | 5,286 | 4,477 | 2,707 | ... |
| 1932–33 ... ... | 81,88 | 8,610 | 4,250 | 1,229 |
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| Average price per ton :— | | | | |
| 1929–30 ... ... | 31 0 0 | 31 8 0 | 29 5 0 | ... |
| 1930–31 ... ... | 18 6 0 | 17 9 0 | 18 3 0 | ... |
| 1931–32 ... ... | 16 17 0 | 17 14 0 | 17 5 0 | ... |
| 1932–33 ... ... | 17 18 5 | 17 4 10 | 17 7 3 | 18 6 10 |
| Average premium per ton over F.A.Q. :– | | | | |
| 1929–30 ... ... | 3 10 6 | 3 3 6 | 7 0 0 | ... |
| 1930–31 ... ... | 2 12 0 | 1 17 0 | 3 0 0 | ... |
| 1931–32 ... ... | 2 9 6 | 2 9 6 | 3 0 0 | ... |
| 1932–33 ... ... | 3 0 11 | 2 13 10 | 4 0 0 | 2 4 3 |
| Average cost of marketing per ton incurred by societies :— | | | | |
| 1931–32 ... ... | 0 7 4 | 0 5 9 | ... | ... |
| 1932–33 ... ... | 0 7 10 | 0 4 5 | ... | ... |
| | £ | £ | | |
| Total reserve of societies :– | | | | |
| 1930–31 ... ... | 120 | 90 | ... | ... |
| 1931–32 ... ... | 192 | 120 | ... | ... |
| 1932–33 ... ... | 280 | 165 | ... | ... |

*Note:*—(1) Some of the Cameroons figures are only approximate.
(2) The average price per ton for Oyo Province for 1931–32 was wrongly given in last year's table as £18 17s. 0d. The correct figure £16 17s. 0d. has been inserted this year.

The figures given above say most of what there is to be said on this subject. It may be mentioned that these figures reflect the work of one officer, whole time, in the Cameroons and part-time work of two officers in the Western Provinces. In addition to the very satisfactory quantitative progress there has been very considerable qualitative progress in all areas, in the increasing extent to which the societies "manage themselves." Most pleasing in this way is the Ilesha Association which now manages its own affairs with an absolute minimum of supervision and with steadily increasing efficiency. It is disappointing that the Ife Association, which is as old as the one at Ilesha, and was at one time equally successful, has not recently progressed in the same way as its rival. However, the Ife Association has been induced to make some reforms and it is hoped that it will put its house in order. Otherwise we must fulfil the threat that we have made to withdraw our help. Work of this kind was started in Ijebu-Ode this year. It was badly needed there (*see* paragraph 61 of last year's report) but we had not previously had the staff to undertake it. Results so far are very satisfactory and are very creditable to all those concerned therewith, including the African assistant. The prospects for the future in this province are now considered to be good. An attempt was made to start this work in Ibadan Division again. But after the unfortunate results of the attempts made by the Ibadan Farmers' Association to export cocoa on their own account two years ago, the association, never a sound one, is now quite incapable of doing anything practical. Another attempt will, if possible, be made next year, using, this time, new small societies which will be formed specially for the purpose and be more or less independent of the Ibadan Association.

## Black Pod Disease of Cacao.

66. As explained in last year's report, a series of four experiments are being carried out on native farms a few miles from Ibadan, in order to study this disease and the efficacy of various control measures. Each experiment consists of a separate farmer's individual plot of cocoa, divided into two parts. One part has been left untouched throughout as a control; but the other was thinned and pruned at the beginning of the experiment early in 1931. In each experiment the "treated" portion also receives another additional treatment. In one experiment, the additional treatment consists of spraying thrice annually with Bordeaux mixture; in a second, the treatment is dusting with a fungicidal copper dust; in the third, dusting with finely divided sulphur; and in the fourth the treatment is "thorough sanitation", which means the burying of all husks and diseased pods and branches—as thorough sanitation as is possible and probably much more thorough than a farmer would ever carry out in practice for himself. The experiment had necessarily to be carried out on native farms, and they are too small to be divided into more than two sections. The value of the results, given in the table below, are thus reduced by the fact that, except in respect of thinning and pruning, there is no repetition of the treatments. Yet the figures are instructive.

67. The following table gives the proportion of cocoa damaged by disease on each plot:—

Black Pod Disease Experiments—Table I.

Diseased Cacao expressed as a percentage of total crop.

| Treatment. | Main Crop. 1931–32. | Main Crop. 1932–33. |
|---|---|---|
| Plot 1— | | |
| Bordeaux Spray ... ... ... | 3·4% | 2·0% |
| Control ... ... ... ... ... | 6·2% | 10·8% |
| Plot 2— | | |
| Copper Dust ... ... ... ... | 8·1% | 2·6% |
| Control ... ... ... ... ... | 12·5% | 5·4% |
| Plot 3— | | |
| Sulphur Dust ... ... ... ... | 5·6% | 3·1% |
| Control ... ... ... ... ... | 8·2% | 10·3% |
| Plot 4— | | |
| Clean Sanitation ... ... ... | 3·8% | 5·5% |
| Control ... ... ... ... ... | 4·1% | 4·7% |

The proportions of the diseased cocoa, as given above, are not based on the actual weight of black cocoa beans. They are calculated by counting the diseased pods and reckoning that 100 pods are equivalent to twenty pounds of wet cocoa or 8.6 lb. of dry cocoa. They thus represent the loss that would have occurred if these diseased pods had been left on the trees until all the cocoa inside the pod had become valueless. The disease starts on the outside of the shells of the pods; and the amount of damage to their contents therefore depends on the frequency of harvesting. In these experiments, the crop is harvested once every three weeks, provided there is then any crop worth harvesting. With this particular frequency of picking, the actual proportions of diseased cocoa were about half the amounts calculated as above from the number of diseased pods.

68. Considerable publicity has been given in recent years to alarming reports of the alleged spread of black pod disease, especially, though not only, in the Ife district. These alarming

reports have arisen chiefly in two seasons—in 1930-31 and again this season 1932-33. The degree of justification for these reports may be judged from the following figures of the tons of cocoa passed for export by the produce inspectors in the last five main-crop seasons (October 1st-March 31st) in the whole of the Western Provinces and at Ife :—

| | 1928–29. | 1929–30. | 1930–31. | 1931–32. | 1932–33. |
|---|---|---|---|---|---|
| Western Provinces... ... | 42,094 | 42,851 | 39,884 | 46,447 | 53,912 |
| Ife ... ... ... ... | 3,645 | 2,897 | 3,708 | 3,341 | 4,014 |

69. These figures show how little real foundation there was for the reports. The main crop of 1930-31 for the whole area was short, as this department predicted in the forecast issued at the beginning of that season; but the short fall was by no means catastrophic, was by no means solely due to black pod disease, and the purchases at Ife itself, in spite of a bad year elsewhere, were greater than they had ever been before, though that record has been surpassed again this year, when the disease was again reported to have decimated the crop at Ife. It will thus be seen that in the two years when these reports from Ife have appeared in the press, the purchases at that town have constituted high records : whether that is, or is not, merely coincidence, it is a striking comment on the trustworthiness of such reports.

70. The four experiments referred to above are not, it is true, situated in the Ife district, but on the Ibadan-Ijebu Ode road. The latter area, however, is thoroughly infested with the disease, and the figures in the table give a fairly sound rough idea of the order of the loss that is commonly caused by this disease in Nigeria. If the crop had not been harvested frequently, the loss would have been from four *per cent.* to twelve and a half *per cent.* in different years and fields. It is equally fallacious to regard such a loss either as catastrophic or as negligible. The best control measure is frequent harvesting. The Nigerian cocoa farmer does not need to be told that; when the price of cocoa is high, he harvests frequently and there is then comparatively little loss of crop from this disease; when the price is low he is liable to be careless and suffers accordingly. The figures in the table give little hope that any other control measures would be economic. Thorough sanitation, which would cost the farmer nothing but labour and care, has had no effect yet. The application of the fungicides takes twenty-one man-days labour per annum for the spray and fifteen for the powders, using knapsack distributors. The Nigerian farmer would never either pay for this treatment to be carried out for him, nor go to the expense of doing it for himself; nor indeed would one like to advise him to do so. (It should be noted that all that has been written above refers to Nigeria proper, not to the Cameroons, where the very wet climate favours the disease more than in Nigeria.)

### Result of Thinning Old Cocoa.

71. In all the above, the effect of the thinning and pruning of the cocoa on these plots has been considered only from the point of view of its effect on the proportion of the crop that is damaged by disease. But naturally it must also be expected to have some effect on the yield of the plots. The figures bearing on this are given in table 2 :—

BLACK POD DISEASE EXPERIMENTS—TABLE II.

Plot Yields in pounds of dry Cacao per acre.

(Calculated at 43% of wet weight of beans).

| Treatment. | Main Crop. | Total Crop. | Main Crop. |
|---|---|---|---|
| | 1931–32. | 1931–32. | 1932–33. |
| PLOT 1— | | | |
| Bordeaux Spray ... ... | 504 | 750 | 856 |
| Control ... ... ... | 516 | 777 | 523 |
| PLOT 2— | | | |
| Copper Dust... ... ... | 862 | 1,071 | 745 |
| Control ... ... ... | 800 | 920 | 907 |
| PLOT 3— | | | |
| Sulphur Dust ... ... | 1,284 | 1,662 | 1,216 |
| Control ... ... ... | 1,361 | 1,673 | 1,160 |
| PLOT 4— | | | |
| Clean Sanitation ... ... | 767 | 1,107 | 750 |
| Control ... ... ... | 928 | 1,145 | 630 |

On plots 1, 3 and 4, there was a loss of yield in the first main crop immediately after the thinning, but the lost ground was recovered in the late crop of the same season, and the thinned plots have done better than their controls in the second main season (1932-3). In plot 2, on the other hand, the yield this year is less on the thinned plot than on the control, although it was greater in 1931-2. In the absence of more replicates, this difference may not be significant; but it is feared that it is so, for it is noticeable that the soil of this plot appears worse than that of any of the others, and this thinned plot has so far failed to recover its canopy of leaves. It now has a bad appearance and looks as though it were more likely to get worse than better. In the other experiments, the canopy has recovered almost completely, and it seems possible, although it is as yet too early to be sure, that on these plots the thinning and pruning will prove to have effected a permanent slight improvement. The cocoa on these plots is some twenty years old; and it is probably rather optimistic to try to improve cocoa, originally planted too closely, which has been left in its overcrowded state for so long. The experience with plot number 2 indicates the discretion and caution that is necessary in advocating or carrying out the thinning of old cocoa.

### THINNING OF YOUNG COCOA.

72. A similar series of experiments in thinning younger cocoa have been made at Owenna, one early in 1931 and three in 1932. The cocoa on these plots, though it had fully formed its canopy and was already in full bearing, was still quite young and thus at a more suitable age for thinning than the fields mentioned in the last paragraph. The canopy on these younger plots recovered very quickly and the plots thinned in 1931 now look very well. There is every indication that the plots thinned in 1932 will give good results next year. Considerable difficulty has been experienced in inducing the owners to consent to continue the experiment for one more season (1933-4). Being themselves already fully convinced of the benefits of thinning, they are anxious now to thin the control plots. The figures given in the table below refer to weights of pods, as it is not feasible in these experiments to weigh the cocoa beans alone. The pods on each plot are counted as well as weighed; and the numbers give much the same results as the weights.

## OWENNA COCOA THINNING TRIALS.

| | Number of trees per acre. | Weight of Pods in lb. per acre. | |
|---|---|---|---|
| | | 1931-32. | 1932-33. |
| *Trial No. 1.* | | | |
| Unthinned | ... ... ... ... 920 | *8,945 | 9,050 |
| Thinned | 1931–32 ... ... ... 660 | *13,015 | 13,625 |
| | 1932–33 ... ... ... 550 | | |
| Increase ... | ... ... ... ... ... | 45% | 50% |
| *Trial No. 2.* | | | |
| Unthinned | ... ... ... .. 1,360 | — | 9,385 |
| Thinned ... | ... ... ... ... 965 | — | 11,235 |
| Increase ... | ... ... ... ... ... | — | 20% |
| *Trial No. 3.* | | | |
| Unthinned | ... ... ... ... 664 | — | 14,128 |
| Thinned ... | ... ... ... ... 504 | — | 12,992 |
| Decrease ... | ... ... ... ... ... | — | 8% |
| *Trial No. 4.* | | | |
| Unthinned | ... ... ... ... 872 | — | 5,160 |
| Thinned ... | ... ... ... ... 472 | — | 5,280 |
| Increase ... | ... ... ... ... ... | — | 2% |

All the above figures are for Main Crop only.

* The first picking of the season was not recorded.

73. If one averages the results from the four experiments in 1932-33, and assumes, as it seems quite safe to do, that the ordinary standard figure for the yield of dry cocoa from a given weight of pods (1 lb. dry cocoa from 10 lb. of pods) is applicable to the pods harvested in these experiments, we obtain the following approximate yields for the main season of 1932-33 :—

Unthinned plots, average yield in pounds of dry cocoa per acre ... ... ... ... 950 lb.

Thinned plots, average yield in pounds of dry cocoa per acre ... ... ... ... ... 1,080 lb.

That is to say that last season there was an increase of fourteen *per cent.* as the apparent result of thinning on the average; and there is reason to expect that next year's average result will be still more satisfactory.

### Kola in the Western Provinces.

74. The encouragement of the planting of Gbanja kola (*i.e.*, the exotic type which is in demand in northern Nigeria) in the Agege, Ijebu Ode and Abeokuta districts was one of the first measures undertaken by this department nearly twenty years ago; the department sold large numbers of seeds and seedlings for planting. As a result, the import of kolas has fallen off greatly in recent years, while the total amount railed to northern Nigeria has greatly increased; in other words, in spite of an increased demand, the locally grown nut has largely displaced the imported one.

75. There are several important problems connected with the growing of kola in Nigeria. The trade has so far been entirely in the hands of a ring of Hausa middlemen. They haggle for their purchases, but do not really compete with each other. Moreover, possibly as a result of small scale and inefficient organisation, the Hausa traders seem to demand an unduly large margin between their buying price at Agege and their selling price at Kano. For two or three years the agricultural officers concerned have tried to find some way of remedying this position. This year, as a result

of our efforts, a European firm entered the trade and offered stated and fair prices for nuts with no haggling. The growers naturally sold readily and it is understood that the firm had no difficulty on the supply side at the price offered. The trade, however, is not a simple one for a firm to handle satisfactorily, owing to the dangers of loss by deterioration during transit and by theft. It is understood that the firm did satisfactorily with their first grade nuts, but lost money on the inferior grades. It is hoped, and believed, that the same firm will extend its operations next season; for they are sure to be highly beneficial to the kola growers.

76. Another problem of kola production in Nigeria is that many of the trees, though apparently capable of bearing a good crop, actually produce very few nuts or even none at all. This phenomenon, which is distinct from differences in hereditary yielding capacity, is not uncommon in fruit trees. Experiments have been made recently at Ibadan in treating kola trees by the various methods that are occasionally used to stimulate fruit trees which do not bear well. A simple method, found by experiment at Ibadan, has vastly increased the yield of kola trees there without damaging them. This result needs confirming by further trials in other districts; but so far as we have gone, it promises to be a valuable innovation for the kola grower, at all events in the parts of the country like Ibadan, where, though the crop can be grown profitably, yet the climate is far from ideal for kola.

77. Another problem is to increase the proportion of the more highly valued white nuts, or, if possible, to produce trees which yield nothing but white nuts. This matter, which is not fully understood yet, is clearly a problem for the plant-breeder and its investigation has been started (*see* paragraph 86). It is hoped also eventually to increase the yield of the trees by selection and breeding. An attempt is also being made to find some way of preventing or lessening the great losses that occur to kola traders through the unduly early deterioration of a proportion of the nuts during handling and transit. It is in the nature of this investigation that there can be no assurance whatever of a successful outcome, but it is possible that some way may be found of effecting improvement.

### Kola in Benin and the Eastern Provinces.

78. Experiments at our farms have demonstrated that Gbanja kola will grow and fruit on poor soils where cocoa generally fails. The farmers of these provinces are thus anxious to take up the growing of such a profitable crop. The department has throughout stimulated such planting by providing instruction in planting, and by sending large quantities of seed from Agege for sale as seed or seedlings for planting. A large party of selected farmers from many different districts east of the Niger was also taken some years ago to see the kola farms of Agege. The man who plants kola to-day takes a certain risk, since the production in the Western Provinces is growing fast, while the demand must, presumably, be limited. We have therefore tried to stop short of direct advocacy of kola planting, and to make it clear that the Nigerian farmer must, like all other farmers, bear the final responsibility for what he plants. But it must be admitted that the distinction between the attitude we have adopted, and one of direct advocacy is a fine one. However, anyone who plants any permanent crop inevitably takes the risk of what the market will be like by the time the trees are fruiting. Moreover, owing to the fact that the oil palm is the only other money crop in the Eastern Provinces, the desire to plant kola is so strong that by refusing our help, we could perhaps hinder the movement, but we could not

prevent it. The figures given below show the amount of kola planting undertaken under our aegis to date. The area promises to increase rapidly in the next few years. In some districts, where there is a possibility, but not a certainty, of cocoa succeeding, we have advised the making of mixed plantations of cocoa and kola.

KOLA PLOTS—EASTERN PROVINCES.

| Year. | Number of new owners. | | | | | | Number of extension by previous owners. | | | | | | Acreage (Approx.) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Benin. | Warri. | Owerri. | Calabar. | Onitsha. | Total. | Benin. | Warri. | Owerri. | Calabar. | Onitsha. | Total. | Benin. | Warri. | Owerri. | Calabar. | Onitsha. | Total. |
| 1928 ... | 4 | ... | ... | ... | ... | 4 | ... | ... | ... | ... | ... | ... | 8¼ | ... | ... | ... | ... | 8¼ |
| 1929 ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 1930 ... | 3 | ... | ... | ... | ... | 3 | ... | ... | ... | ... | ... | ... | 6½ | ... | ... | ... | ... | 6½ |
| 1931 ... | ... | ... | 5 | ... | 8 | 13 | ... | ... | ... | ... | ... | ... | ... | ... | 5½ | ... | 33½ | 39 |
| 1932 ... | ... | 1 | 11 | 21 | 11 | 44 | ... | ... | ... | ... | 1 | 1 | ... | 2½ | 14 | 18 | 21¼ | 55¾ |
| | 7 | 1 | 16 | 21 | 19 | 64 | ... | ... | ... | ... | 1 | 1 | 14¾ | 2½ | 19½ | 18 | 54¾ | 109½ |

EXPORT OF PINEAPPLES.

79. Experimental work carried on after the main pineapple season of 1931-32 and during the past season has enabled us successfully to establish a method of handling fresh pineapples so as to land them in England in first rate condition. This satisfactory result, while highly creditable to two members of the department who have carried out the work has only been made possible by the assistance of many persons outside the department. The Manager of the Cold Store at Lagos, has placed every possible facility at our disposal and has found nothing too troublesome that we wanted done. Messrs. Elder Dempster and Company have throughout adopted a similar attitude, while the Empire Marketing Board, Messrs. Pouparts of Convent Garden and several other fruit brokers and merchants in England have given their expert opinions on the fruit as it arrived in England. A method of preventing the occurrence of internal discolouration and rot has been worked out, but still needs complete final confirmation in use on a large scale. To place the fruit on the market in England in the exact state of ripeness and with the bright yellow colour that the market demands, is only possible on a commercial scale if the buyer has a cold store at his disposal on shore. It is clear that attempts to ship fruit without the use of cold storage ashore before shipment will always result in such a large proportion of fruit falling below the necessary standard of quality on arrival, that the losses on that part of the fruit will more than swallow up the profit made on such part as does arrive in good condition. Thus this trade is inevitably, for the moment, practically a monopoly in the hands of one firm. This is possibly no disadvantage, for it will be a few years before the trade is of such dimensions as to be worth anyone's while if shared; and the fact that there is only one exporter naturally facilitates the considerable amount of work that we shall still have to do in teaching growers to harvest fruit at exactly the right stage and in learning and teaching buyers the best technique of selecting grading and packing.

80. The shipments this season (1932-3) have all been reasonably successful, and have presumably been profitable to the exporter, although only the last one was treated in the way finally found to be best. Very unfortunately the supply of fruit this year has been much less than before. This is undoubtedly partly due to the abnormally light rains of 1933; but it is also partly due to the

fact that many suckers that would have borne fruit this year have been cut off and replanted by the farmers in order to increase their crop in the future. Previously pineapples have only grown practically wild. Efforts are now being made, not entirely unsuccessfully, to introduce the practice of cultivating them as a crop. Naturally it will take two or three years for the production to increase to any considerable commercial scale; but there now seems every reason to hope that before very long this will become a valuable minor export, and one that will return a handsome profit to both grower and exporter. Opinions vary as to whether our pineapples are superior or slightly inferior to those of the Azores, according to whether the particular expert who reports upon them attaches more importance to the flavour, juiciness and size, in which respects our pineapples are apparently fully equal or even superior to those from the Azores, or to colour: for the colour of our pineapples has so far been rather inferior, though it has steadily improved as we have perfected our technique. Now the Azores pineapples are grown under glass, and in view of the expense of glass house culture as compared even to a well cultivated field, it is clear that even if we have to be satisfied with a price rather below that of the Azores pineapples, and even if the day should come when our supply began to exceed the demand at present prices, yet there must still remain excellent prospects for this trade.

### Work of the Botanical Section in the Southern Provinces.

81. At the beginning of the year the botanical and mycological sections of the department were amalgamated. The botanical section has, for some years, been occupied almost exclusively with plant breeding and allied investigations, and work on plant diseases is now co-ordinated with this programme. Work with cotton has been mentioned elsewhere in the report, as has also that on beans, the experiments in control of blackpod disease of cocoa, and the study of methods of treating kola to improve the yield, all of which are in the charge of the botanical section. The progress of the other major lines of work of the section is reported in further paragraphs below. In addition to these major lines, work not yet justifying mention here is also in progress with coffee, chillies, pepper, cassava and yams, and a general survey of plant diseases is gradually being made to augment the somewhat scanty data at present available. This survey is naturally concerned chiefly, though not exclusively, with economic plants.

### Oil Palm Breeding.

82. Oil palm selection has been in progress since the end of 1927, and the first phase of this work, the controlled pollination of the Calabar plantation palms, is now completed. On account of the impossibility of adequate supervision, owing to the inaccessibility of Calabar, completely reliable results have proved to be unattainable. Control inflorescences, which are left unpollinated, suggest that approximately eighty *per cent.* of the Calabar fertilisations should be free from contamination by rogue pollen, a further ten *per cent.* should only be affected by outside pollen to quite an unimportant extent, while the remaining ten *per cent.* have been most probably seriously prejudiced. Further work on controlled pollination will be transferred to Ibadan, where the methods can be re-explored, and where palms raised from Calabar seed will be available in some two years time for a start to be made with selfing for the next generation. Some twenty-five acres of what are termed " oil palm yield test blocks " have already been established at three experimental stations (Ibadan, Benin and Umuahia) to test

the progeny of the Calabar selections; some of these palms are now commencing to fruit. In addition, a twenty acre plantation block, planted with similar seedlings, is being laid down at Onitsha. Once comparatively large numbers of the first generation of the oil palm selections are bearing, it should be possible to judge fairly accurately to what extent rogue pollination actually occurred at Calabar, for palms raised from each fertilisation have been treated separately. The selection for yield is likely to be less seriously affected by this lack of complete reliability in the initial controlled fertilisations than will the elucidation of the inheritance of fruit form. The latter problem is one which has been the subject of much speculation and differences of opinion among the botanists concerned with this crop in various countries. It is a problem of much theoretical interest, and not without some practical importance.

### Citrus Fruits.

83. As mentioned in the last annual report, samples of fruit from our best orange and grapefruit trees were sent home to the Empire Marketing Board, and the reports on these test consignments have since been received. The report on the grapefruit is somewhat encouraging, in that it appears that fruit from one at least of the best trees at Moor Plantation would be immediately saleable in quantity, although all the fruit on that plantation suffers from the defect " blemish ". Fruit from native farmers will almost certainly always suffer from the same defect. Through the courtesy of the Baptist Mission, Ogbomosho, a few fruits were included from a superior grapefruit, which was introduced there some years ago from America. This tree is probably one of the best mature grapefruits now growing in Nigeria. Its fruit was more favourably reported upon than that of any of the trees at Ibadan, so steps have been taken to multiply progeny of this tree for extended trial on our experimental farms. The reports about oranges make it quite clear that the experts do not consider our fruit very suitable for the United Kingdom market. These reports are, however, written with a high class trade in view, and it seems that the writers have rather overlooked the possibility that Nigeria might find a profit in selling a much lower class of fruit at prices far below those current in the fruit trade to-day. Yet, even allowing for this, it is evident that, for a successful export of fruit, attention to quality and to market prejudices is of paramount importance. It is also possible that what is saleable profitably to-day may not be acceptable ten years hence, except perhaps for canning. Thus extensive citrus planting by the Nigerian farmer at the present time, to supply a problematic export, can hardly be advocated. There is, however, a potential local demand to be supplied, for which our present best varieties are entirely suitable. An increased interest in the growing of citrus fruits for domestic consumption would be most beneficial, for such a trade could supply useful information and experience and form a step towards a future export trade. But fantastic prices must not be expected for fruit grown for local sale. Nor indeed could such prices be maintained by an export trade.

84. Excepting possibly a very few individual trees, it is apparent that the present types of Nigerian citrus fruits must be improved, if there is eventually to be an export trade. Introduction of new varieties of all kinds of citrus is in progress from the established fruit producing countries, and the best local types of grapefruit and orange are being multiplied. Budwood of several varieties, mostly of recent introduction to Sierra Leone, were obtained last year through the courtesy of the Director of Agriculture of that Colony, and some plants of each variety have

been successfully raised. Trials have been planted up at Ibadan and at Agege which form a preliminary test of the different citrus stocks. At each of these two stations a selected orange and grapefruit scion, from the Moor Plantation orchard, is being tested on seven different stocks. These trials will not only indicate the most suitable stock for each of these localities, but will serve to test and multiply the progeny of our present best scions.

### Cocoa Breeding.

85. Experimental plots of cacao were planted some eight years ago on the farms at Benin and Umuahia, but it has become apparent that the soil at both places is unsuited to the crop, and no useful information has been gained. It has therefore been found necessary to recommence experimental work on cacao in those districts where the crop is of major economic importance. This has led to the preparation of land for experimental plots at Moor Plantation and Owenna. The latter is a new small experiment station in the Ondo Province which, by the courtesy of the Director of Forests, has been established in a forest reserve, so as to be isolated from other cocoa. All these experimental plots will be established with self fertilised seed from high yielding parents. As a result of experiments on the controlled pollination of cacao concluded early in the year, little difficulty was found in obtaining an adequate supply of self fertilised seed from ten selected parent trees. The plantings are arranged so as to provide data on the advantages of shade, and of wide spacing as compared to close spacing and subsequent thinning. Yield recording at Moor Plantation has been continued at three weekly intervals throughout the year. The figures show an appreciable decline on the previous year's crop—673 lb. dry cacao per acre as against 1,102 lb. A severe attack of *Sahlbergella* spp. is believed to have been mainly responsible for this decline.

### Kola Breeding.

86. Individual yield recording of kola trees has been continued at Ibadan, Benin and Umuahia. Figures covering two years are now available, and several trees at Ibadan and Benin have given very satisfactory yields over this period. An analysis of fruit from trees grown from white and pink nuts at Ibadan gave the following results :—

| | White. | Pink. | Red. |
|---|---|---|---|
| Trees planted from White nuts produced— | | | |
| 1931 ... ... ... ... | 485 | 36 | 147 |
| 1932 ... ... ... ... | 309 | 27 | 21 |
| Trees planted from Pink nuts produced— | | | |
| 1931 ... ... ... ... | 91 | 2,450 | 84 |
| 1932 ... ... ... ... | 3 | 703 | 152 |

Attempts will be made to self fertilise flowers from those trees which have produced only white nuts over the two years.

### Work of Chemists in the Southern Provinces.

87. In the South the chemists have co-operated in the liming experiments at Umuahia, which are mentioned in paragraph 48. They have also continued their endeavour to find out why it is that cocoa will be easily established on one soil, but not upon another which may seem to be, superficially, of roughly the same type; or

why on some soils cocoa suddenly fails prematurely after flourishing for a number of years, for no very obvious reason. It was hoped that, in the majority of such instances, it would be found that the cause was the same, so that there would be some one criterion which would serve to classify good and bad cocoa soils. So far this does not seem to be the case. The failure of cocoa here seems to be liable to arise from many different causes. In extreme instances, it is, of course, possible to say with some certainty that " this is a soil on which cocoa is very unlikely to succeed " or " that is a soil on which cocoa can be expected to succeed ". But, although the investigation has considerably increased our knowledge of the subject, there still remain many instances in which it is not possible to decide whether cocoa will succeed or how long it will thrive, by any quicker method than actual trial.

88. In addition to these two pieces of work and one or two minor ones similarly carried out in conjunction with other sections of the department, the chemists at Ibadan have continued steadily to progress with their soil survey of the whole of Nigeria. Some 1,900 samples of soils have been collected, and about 1,000 of them have been fairly completely examined. Samples are sent in by Superintendents of Agriculture from fields on our own farms or from fields in the districts; the samples are thus generally of some soil in which the Superintendent is interested in connection with his own work, and very few soil samples have as yet been collected solely for the purpose of the survey alone. Thus, while the results of the examination of these numerous samples already give one some fair idea of the soils in these provinces which chiefly contribute to the agricultural exports, other parts of the country, which are as yet less opened up to trade, still form large gaps in the soil survey. These gaps will only gradually be lessened as opportunity offers for the taking of the samples, and for their examination without detriment to other investigations. However, we already have very much more knowledge of Nigerian soils than we had two or three years ago; and in proportion as we make progress in the experimental work at our farms and in our extension work, so does this knowledge become more useful.

89. The present arrangement of the posting of the chemists is that one officer works always at Zaria, and another always at Ibadan, while the most senior of the three divides his time between the two stations. Now that the European chemists have an adequate staff of trained and reasonably capable native assistants, this arrangement is satisfactory as well as economical; provided always that the leave roster is not seriously disturbed by the invaliding or transfer of any officer. Thanks to the help of the assistants, the section is achieving continuity in a programme of work at least three times as great as it would have been wise for three officers to attempt even two or three years ago.

### The Departmental School at Ibadan.

90. A fairly satisfactory class finished their course in December 1932. There were no outstanding pupils, as good as the best of some of the earlier classes; but, on the other hand, the general standard this year was considered to be rather above that of previous years. No new permanent posts could be created during the financial emergency, so we could only offer the pupils " temporary appointments " on £36 per annum when they finished their training. But even this was better than turning them away altogether and none of them refused the offer. A new class will not be recruited in their stead. There is thus only one class in the school now, and they are in their second year. They will be the

last class turned out under the present system. In future the standard of the course will be much higher, and the school, which will then presumably have to be called " the college ", will practically form a part of the Higher College at Yaba. The students will come on to us after they have spent some time at Yaba, though the length of that time is still under discussion. The whole college course at Yaba and Ibadan will probably take four years. The entrants into Yaba will all have completed a middle school course. Previously our standard qualification was nominally only the completion of the old elementary course to standard six, although actually the competition for the scholarships was so keen that few boys succeeded in gaining them who had not spent some time in a secondary school. In future, with so much better educated entrants, we hope to be able to turn out a correspondingly better " product ". The hiatus in the recruitment of assistants which the change will cause is not to be regretted. We have hitherto had need of more men than we could train, but the " point of saturation " was coming in sight, especially now that all the assistants needed in the Northern Provinces can be trained at Samaru.

### Produce Inspection.

91. The reduction of staff was effected last year in accordance with the recommendation of the Produce Inquiry Committee, as reported in my last year's annual report. All the evidence is that the efficiency of the work has been maintained in the past year though the effectiveness of the supervision seems to be nearly down to the danger point. A few new minor difficulties have arisen and had to be overcome. For instance, the system of bulking oil at the ports instead of exporting it in casks has resulted in a lowering of the standard of the caskage at the buying centres. In consequence, when the oil has to be rafted down a creek, water sometimes enters the cask. This renders it more difficult for the inspector to keep a check upon the work of his examiners " up country ", by means of re-examination at the port. But every year some such change in the conduct of the trade produces some minor practical difficulties such as this, and they have not been more numerous this year than usual, nor have they been only such as are ascribable to shortage of staff. The financial effect of the reduction of staff may be seen from the following figures for the financial years April 1st to March 31st :—

| | | £ |
|---|---|---|
| 1928-29 | Excess of expenditure over revenue ... | 7,281 |
| 1929-30 | Excess of revenue over expenditure ... | 5 |
| 1930-31 | ,, ,, ,, ,, ,, ... | 78 |
| 1931-32 | ,, ,, ,, ,, ,, ... | 272 |
| 1932-33 | ,, ,, ,, ,, ,, ... | 11,279 |

The last figure is a close estimate only, as the final accounts for the financial year are yet not available. None of these figures takes account of the cost of the provident fund that is to be instituted for the staff, with it is hoped, retrospective effect. The accounts in the later years also include, on the expenditure side, some items that were not previously included.

92. The cocoa grades have again had to be altered this time in consequence of changes that have occurred in the countries to which our cocoa is shipped. We were strongly advised by the trade that there was no real demand for the Grade II, as such, of the season 1931-2; and that in future it would be impossible for buyers to pay any premium for that grade over the price of Grade III. At the same time notice was given by the American Government of

impending changes in the standard of freedom from mouldy or weevily beans that would be demanded in all cocoa permitted to enter the United States of America in accordance with that country's stringent " pure food " laws. It is highly desirable that anyone who buys any Nigerian cocoa except that of the lowest grade, should be able to send it to the United States of America with complete confidence that it will not be refused admission by the Government inspectors at the port of entry. The change in the American regulations will not become fully effective until October 1933; but as our grades had to be changed anyway last year, it was deemed advisable to make at the same time the changes necessitated by the new American standards.

93. Roughly it may be said that Grade I remains without any important change; the present Grade II represents the old Grades II and III combined, but with a distinctly stricter standard; the present Grade III is the old Grade IV, augmented by the cocoa which passed the old Grade III but not the new. This change has caused the quantity of Grade IV to increase from about two *per cent.* of the whole to about eight *per cent.*

94. At the same time an additional criterion was introduced by taking account of the size of the beans, which is a very important factor in the commercial value of cocoa. Any cocoa of which 300 beans weigh less than eleven ounces is now called " M.C." cocoa (*i.e.* Mid Crop) and the bags containing it bear this mark in addition to the crowns which show the grade of the cocoa, as determined by its content of defective or insufficiently fermented beans. This general idea, and the special question of the best weight at which to place the dividing line, had been a subject of discussion and inquiry for some years. The individual beans of such cocoa as ripens out of the main season are smaller, and hence lighter, than those of the main crop. Moreover such cocoa generally, though not necessarily, also contains more mouldy, weevilled and unfermented beans than does the main crop cocoa. For many years, it has been the custom of the local buyers to offer seven pounds per ton less for out-of-season cocoa than for the main crop. Moreover there has recently been only one firm buying " out-of-season ". The absence of competition must at least have tended to reduce the price offered then rather than the reverse, and has certainly caused middlemen and producers to doubt whether the highest price possible was paid at that time of the year. Practically only one price was offered for any mid crop cocoa that reached the exportable standard, even for any that was of Grade I or Grade II. In spite of all this the quality of the mid crop cocoa has increased rapidly in the last three years, until nearly half is now of Grade II. The proportion of mid crop to total annual crop, usually about eight *per cent.*, seems also to be increasing slightly. It was naturally unsatisfactory to producers and to middlemen to be unable to get a better price for superior mid crop cocoa. The position was also rather unsatisfactory for exporters; for sellers, being unable to get what they considered a fair price for such cocoa, were inclined, if they could, to hold it and mix it subsequently in their main crop parcels. Some exporters have been inclined to regard this mixing as fraudulent. But any commercial parcel of cocoa in Nigeria, even one of five tons, necessarily consists of many farmers' separate harvestings, which have been bulked by a buyer. The size of the beans decreases gradually at the end of the main season, and it is quite impossible to define any form of bulking or mixing that can possibly be called illegitimate, so long as there is no adulteration with foreign material. Now it presumably does not matter to the manufacturer of chocolate and cocoa, and it certainly does not matter to the merchant

at what date a certain parcel of cocoa was harvested. All that matters is the manufacturing or commercial quality of the sample, which depends on the size of the bean and the proportions of defective and unfermented beans. Thus the obvious solution of the problem was to introduce into the definitions of our grades a standard of size of bean. For some years the weight per 300 beans of all parcels of cocoa graded at the most important buying centres has been recorded by produce examiners in order to provide data on this point. Some of the firms at home have also weighed 300 beans out of samples arriving at different times of the year. These observations pointed to eleven ounces per 300 beans as a suitable standard to form our dividing line. The standard is considered to have been justified in practice so far as this one year's experience goes. Until the very end of the main season all the main crop cocoa was well above the standard of the total quantity graded from October to March inclusive. Only one half of one *per cent.* was below the standard, and thus had to be marked " M.C. "; and of that M.C. cocoa four-fifths was graded in March, which is the border-line month. Some of this cocoa that was thus marked " M.C." in March was very nearly up to the standard of weight. This is, of course, inevitable. Whatever standard is adopted, there must be some instances in which the 300 beans weigh almost exactly the number of ounces which constitutes the dividing line. The fact that these parcels would almost certainly pass as main crop cocoa in any commercial dealings, hardly discredits our standard; and it will be noted that they were harvested during the month which is regarded as on the border line at the end of main season. The terminology of the cocoa crops is rather vague, such terms as mid crop, easter crop and mid-season crop being used without any exact definition. It would probably have been better to call the cocoa which weighs less than eleven ounces per 300 beans, either " light cocoa " or " late crop cocoa " and to label the bags containing it " L.C." instead of " M.C." This suggestion is now being discussed with the trade.

95. The figures below, referring to the main season gradings (October to March inclusive), give the quantity which was passed in Grade I and show how the quality of Nigerian cocoa is rising. Owing to the change of the definitions of the grades it is impossible this year to give simple figures showing the improvement in the lower classes of cocoa although it can be detected in the complete records.

| Grade I. | 1930-31. | 1931-32. | 1932-33. |
|---|---|---|---|
| Tons approximate ... ... ... | 3,700 | 5,600 | 9,700 |
| Per cent. of total crop ... ... ... | 8·5 | 13·0 | 18·0 |

96. Our grading system and its working was commended by the committee appointed by the Imperial Economic Committee to report on cocoa (H.M. Stationery Office 1932 pp. 28-31, and 33). This commendation is highly appreciated: for the Government of Nigeria received encouragement from few sources, and discouragement from several, when it first took the considerable responsibility of introducing this stringent system of inspection. It is also gratifying to learn that no Nigerian cocoa was refused entry into the United States of America during the year ended 30th September, 1932. The success of the scheme is to be ascribed not only to the loyal work of the produce inspectors, but also to the assistance given to us by the local Advisory Committees; and perhaps most of all to the unswerving support and constructive criticism which we

have received from some individual members of the home commercial association and Chambers of Commerce—support which at that time represented, in effect, a minority opinion, though I am glad to say that the position is now very different.

### Inspection by Native Administrations.

97. In Ibadan Province a scheme of inspection in the interest of native buyers, and financed by them, had been in operation for some years. This scheme was nominally unofficial, but received some support and authority from the Native Administration. The supporting of the system by the Native Administration was irregular and objectionable. The Resident therefore caused the scheme to be closed down early in 1932. The native buyers pressed for its resuscitation for the cocoa season 1932-33. It was therefore decided to give a trial to a scheme of produce inspection which would be officially and entirely managed by the Ibadan Native Administration. A scheme was worked out in detail in several meetings with the firms' native buyers and the " Scalemen ". It was organised and started by an inspector of produce who happened to be supernumerary for a few weeks. After the scheme had been started, the traders objected to paying the sums of money they had promised for the financing of the system. Eventually the whole scheme was closed down at the end of December without having ever been in full operation. There is no doubt the Ibadan Traders wished to have a system of inspection in the numerous primary markets; but they had hoped that, under the Native Administration, difficulties would be put in the way of certain natives of other divisions who buy in the markets of the Ibadan Division. They had also anticipated, apparently, that the examiners previously employed by the " Buyers' Union ", who were all relatives of the leading buyers, would be re-engaged by the Native Administration. When it was seen that the scheme would be supervised by the Inspector of Produce at Ibadan, that he would train the Native Administration examiners, and that those examiners would be under the immediate supervision of seconded senior Government Produce Examiner, they started to raise objections and make difficulties to such an extent that it appeared wiser to close the whole scheme down altogether.

98. The Abeokuta Native Administration scheme was discontinued early in the year as a result of a misinterpretation (as it seems to me) of a sentence in His Excellency's address to the Legislative Council in February, 1932. Although that scheme had been fairly efficiently managed for some years, the cessation of operations was not followed by any fall in the quality of the produce offered for sale, nor, so far as we could see, by any increased difficulties for anyone. At present, the Abeokuta native buyers still keep examiners in the smaller markets whom they employ co-operatively; but it is exceedingly doubtful if those examiners do any work at all. I consider that it can now be regarded as proven by experience that systems of inspection in primary markets by inadequately supervised examiners do little or nothing to improve the quality of the produce; and that if they do any slight amount of good it is so very slight that it justifies neither the cost of the system, which must ultimately be borne by the producer, nor the giving of any official support or encouragement to an arrangement which must inevitably lead to much corruption and petty oppression.

### Cocoa Moth.

99. Insect damage to cocoa in Nigeria in recent years has been almost entirely due to weevils, not to the cocoa moth (Ephestia) which is, economically, a far worse pest. Indeed, for several years, the number of cocoa moths that were annually seen by inspectors

could almost have been counted on the fingers of one hand. In the current season, however, several stores were found to be seriously infested. Relative to the total quantity of cocoa exported from Nigeria the amount damaged by moth was undoubtedly still negligible. It was also negligible as compared to the infestation that takes place in some of the places where cocoa is stored after arrival in England. But this is such a serious pest that no step should be neglected that will help to keep our cocoa free from it. Just after the war cocoa had repeatedly been held in store in Nigeria as a result of shipping difficulties and of the violent fluctuations of the market. The moth was then common here. Subsequently, for several years, it was very rare. It began to be seen again in 1932-3. The moth is essentially a pest of stored products. It must occur in nature; but it only appears in numbers in stores (or the holds of ships?) where products are stored on which it can feed. It seems very probable, therefore, that the disappearance of the moth in the intermediate years was due to the fact that little or no cocoa was then ever held in store here during the rains; and that its reappearance this year may well be due to the fact that much cocoa was again stored in Nigeria during the rains. It is hoped that it will disappear again if this practice is discontinued.

100. Now it is not really wise to store cocoa in Southern Nigeria during the rains, even apart from the encouragement of the cocoa moth. The damage that will occur from mould and weevil may not render the cocoa valueless; but it will reduce first grade cocoa to third grade, or even make it so poor as to need much picking over before it can be exported at all. The damage will generally be less at a relatively drier place like Ibadan than at Lagos; and much less in a good dry, well ventilated store, with good dunnage and careful stacking, than it will be in bad conditions. It was also less last year, when the atmosphere during the rains was very exceptionally dry, than it would have been in a normal year. Most of the stores here, though suitable for the purpose for which they are built, namely short period storage in the dry weather, are totally unsuitable for prolonged storage in the rains. If storage in the rainy season should become common, it will be necessary for Government to consider giving me power to prohibit storage between certain dates, except in suitable stores, and with every precaution. It is useless for the country to produce good cocoa if it is to be allowed to deteriorate in store before export; and the cocoa moth can become such a serious pest in the countries to which the cocoa is shipped, that it is incumbent on any exporting country, for the sake of the good name of its produce, to take every possible measure to reduce the degree of the infestation of its exports. The provision of really good produce stores in Nigeria, would probably make it dearer to hold cocoa here than in Europe. But fortunately there is reason to hope that buyers will not again desire to hold their cocoa in Nigeria for long periods.

101. As soon as the moth was observed, Inspectors of Produce devoted much attention to the inspection of stores from this point of view, and to inducing agents to clean and disinfect contaminated stores as well as possible, though some of the stores are so constructed that they cannot be cleaned very satisfactorily. It is questionable whether we have legally the power to compel such measures to be taken; but the agents responsible, on being personally approached, did voluntarily all that was required. Obviously it was in their own interest to do so; but their ready co-operation was highly appreciated. Such voluntary co-operation, when it can be obtained, is preferable from all points of view, to compulsion by means of regulations.

102. It is perhaps necessary to emphasise that the above is written only to call attention to a danger that is as yet only potential. As stated above, we have evidence from reports from home, as well as in our own observations, that, as compared to the total quantity exported, the amount of moth infestation last year was very small. No cocoa is being held up in the country at present. The few stores that were infested were thoroughly cleaned at the beginning of the season, and few moths were seen thereafter. It is therefore probable that the moth will again disappear completely from our cocoa.

O. T. FAULKNER,
*Director of Agriculture.*

IBADAN,
31st May, 1933.